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Annual Report of the Department of Agriculture in the Province of Bombay, 1944-45

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ANNUAL REPORT OF THE DEPARTMENT OF AGRICULTURE, BOMBAY PROVINCE.

1944-45.

CHAPTER I.

THE AGRICULTURAL YEAR, 1944-45.

CLIMATE AND RAINFALL.

(1) The agricultural season of 1944-45 may, in general, be regarded as fair over the greater part of the Province, but judged by crop growth and outturn it was less satisfactory than the preceding one. The regular monsoon commenced from the middle of June and the initial rainfall was fairly adequate particularly in the southern areas of the Province. In the first fortnight of July, there were fairly substantial and timely rains in most tracts which enabled the cultural operations to be undertaken on a general scale. The precipitation from mid-July to mid-August was markedly heavy in the northern parts of the Province and as a result cultural operations were impeded and newly germinated crops were damaged. This excessive rainfall was particularly heavy in South Gujarat and North Deccan, where cultivated lands were flooded and in some low-lying places crops were washed away. In the south-eastern regions of the Deccan and the Karnatak, on the other hand, the rainfall was light and irregular and consequently the *kharif* crops were deteriorating due to insufficient soil moisture In the Konkan and the western parts of the Deccan and the Karnatak, the rainfall was substantial and the *kharif* crops progressed satisfactorily. Opportune and welcome rains occurred in September in parts of Gujarat, the Deccan and the Karnatak and the fall in the third week of the month greatly benefitted the *kharif* crops and accelerated *rabi* sowings, promising a successful *rabi* season. The rainfall in the Konkan was short of normal requirements, which arrested the crop growth and checked grain formation of paddy and *nagli*. The rains in the first fortnight of October had a beneficial effect on crop growth, but the precipitation towards the end of the month was heavy in the southern areas of the Province, where standing and harvested *kharif* crops were slightly damaged, causing shedding of grain and spoiling the quality of the produce. With some showers of rain in the first fortnight of November, in the southern areas of the Province, the season was closed. The absence or inadequacy of later rainfall, combined with other adverse climatic factors, such as dry easterly winds, cloudy dull weather, occurrence of the cold spell, accompanied by rain and strong winds, nullified the early promis (of a successful *rabi* season and the outturn realised from the *rabi* crops were below normal, over most areas, especially on the lighter types of soils and in the south-eastern districts of the Province. The climatic conditions were also conducive to the increased damage to crops by insect pest and plant diseases. Accordingly, the agricultural season of 1944-45, as far as the *kharif* season was concerned, was disappointing in the Northern areas of the Province, while the *rabi* season, though better in crop acreage than the preceding year, yielded reduced crop returns in most of the areas of the Province.

CROP STATISTICS.

(2) *Area.*—Taking all crops together, there has not been substantial increase in the total area sown as compared with the preceding year. The area under rice increased by 2·9 per cent. and 4·3 per cent., respectively, over the preceding year and the decennial average. The area under wheat showed substantial increase,

i.e., by 30·1 per cent., and 19·0 per cent. respectively over the preceding year and decennial average. The area under *jowar* (grain) has also increased by 6·3 per cent. and 2·9 per cent., respectively, as compared with the preceding year and the decennial average. The area under *bajri* has shown a decline by 7·0 per cent. as compared with the area of the preceding year but is still 17·4 per cent. over the decennial average. The area under gram has increased by 34·5 per cent. over the preceding year and by 5·8 per cent. over the decennial average. The area under *tur* has decreased by 8·6 per cent. as compared with the preceding year but shows tan increase by 8·7 per cent over the decennial average. The area under cotton has decreased substantially, i.e., by 55·6 per cent. and 63·7 per cent., respectively, as compared with the preceding year and the decennial average. Under oil seeds the area under sesamum and castorseed has declined but the area under groundnut and linseed has increased. The area under tobacco has also increased by 38·1 per cent. as compared with the area of the preceding year but has not reached the decennial average which is still 12·6 per cent. higher than the area in the year under report.

The area under sugarcane has increased by 3·6 per cent, as compared with the preceding year and 34·4 per cent. over the decennial average.

The table below gives the actual acreage under the more important crops in the Province in the year under report, i.e., 1944–45, the preceding year 1943–44 and the average acreage of the decennium 1933–34 to 1942–43.

No.	Name of the Crop.	Acreage in the Bombay Province. 1944–45.	1943–44.	Acreage of decennium 1933–34 to 1942–43.
	Cereals.	Acres.	Acres.	Acres.
1	Rice	2,062,692	2,005,192	1,977,521
2	Wheat	2,032,347	1,562,296	1,707,287
3	*Jowar*	8,063,226	7,586,225	7,835,105
4	*Bajri*	4,720,999	5,077,176	4,021,281
	Fibres.			
5	Cotton	1,339,492	3,019,647	3,687,866
	Pulses.			
6	Gram	651,457	484,342	615,789
7	*Tur*	446,820	488,605	411,202
	Oilseeds.			
8	Groundnut	1,525,303	1,363,208	1,248,223
9	Sesamum	123,300	164,782	158,137
10	Linseed	77,080	68,329	112,930
11	Castorseed	53,215	56,452	44,698
	Miscellaneous.			
12	Sugarcane	120,265	116,111	89,462
13	Tobacco	143,821	104,175	164,537

(3) *Production.*—The estimated production of food grain crops has on the whole decreased over that of the last year owing mainly to the failure of *kharif* and *rabi* seasons. The outturn of rice, jowar, *bajri* and *tur* has decreased as compared

with the preceding year. The outturn of wheat has increased by 13·3 per cent. as compared with the preceding year but showed an increase of 2·1 per cent. as compared with the decennial average. The increase in the outturn of wheat is not in proportion with the increase in the area. The restimated production under gram has increased by 23·0 per cent. and 5·3 per cent., respectively, over the preceding year and the decennial average. The outturn of groundnut has increased by 11·5 per cent. and 22·1 per cent., respectively, as compared with the preceding year and decennial average.

The outturn of sugarcane (gul) has increased by 3·6 per cent. as compared with the preceding year but showed an increase of 77·5 per cent. over the decennial average.

The outturn of cotton in bales has substantially decreased respectively by 65·0 per cent. and 67·7 per cent. as compared with the preceding year and decennial average. The reduction is mainly due to the reduction of area under cotton and unfavourable season.

The outturn of tobacco has increased by 38·1 per cent. over the preceding year but showed a decrease of 18.8 per cent. over the decennial average.

The outturn of castor seed and sesamum has decreased as compared with the outturn of the preceding year but the outturn of linseed has increased by 12·8 per cent. over the preceding year.

The table below gives the yields of more important crops in the Province in the year under report, i.e., 1944–45, the preceding year 1943–44 and the average yield of the decennium 1933–34 to 1942–43.

No.	Name of the crop.	Production of crops in the Bombay Province. 1944–45.	1943–44.	Average of decennium 1933–34 to 1942–43.
	Cereals.	Tons.	Tons.	Tons.
1	Rice	825,201	882,093	809,789
2	Wheat	305,969	270,139	299,630
3	*Jowar*	1,217,709	1,338,377	1,319,595
4	*Bajri*	461,860	638,625	487,639
	Fibres.	(Bales 400 lbs.)	(Bales 400 lbs.)	(Bales 400 lbs.)
5	Cotton	220,092	629,581	682,264
	Pulses.	Tons.	Tons.	Tons.
6	Gram	97,944	79,652	92,987
7	*Tur*	106,659	131,201	102,310
	Oil seeds.			
8	Groundnut	624,063	559,789	510,941
9	Sesamum	14,772	19,742	17,770
10	Linseed	7,391	6,552	10,735
11	Castorseed	7,317	7,762	5,509
	Miscellaneous.			
12	Sugarcane	418,626	404,159	235,842
13	Tobacco	30,559	22,121	37,628

CROP PRICES.

(4) The economic disturbance due to the war continued to dominate the trend of prices of agricultural produce which remained high as the preceding year. In general the prices of common consumers' goods were fixed by Government by adopting control measures. The rationing schemes continued in all important urban areas and the levy schemes worked satisfactorily. Thus the steady level of prices was maintained by Government. Transport difficulties and the uncertainty in the international situation coupled with the speculative and hoarding elements of merchants adversely affected the agricultural prices. Due to guaranteed prices of food crops the economic condition of the agriculturists was on the whole satisfactory. Detailed information regarding fluctuations in the prices of important agricultural commodities during the year under report is given in Chapter VII of the "Season and Crop Report, Bombay Province, 1944-45" and need not be repeated in this Report.

AGRICULTURAL LEGISLATION.

(5) During the year under report, the Bombay Land Improvement Schemes Act, 1942, (Bombay Act No. XXVIII of 1942) was amended further with a view to carry out the various provisions in the Act rapidly enough to keep pace with the work which is progressing more rapidly than was originally contemplated. Accordingly, the procedure prescribed under the Act has been simplified by dispensing with formal individual notices, the detailed provisions of Sections 7 and 8 and the preparation of record of rights and liabilities under Section 13. The rights and liabilities created by schemes under the Act are to be incorporated in the existing record of rights maintained under the Bombay Land Revenue Code.

During the year under report, the Bombay Cotton Control Act, 1942 (Bombay Act No. XXX of 1942) has been applied to the Kumta-Dharwar area with effect from 1st July 1944. According to this, the cultivation of only Jaywant, Gadag No. 1 (Upland) and Cumbodia (Co. 2) varieties of cotton has been permitted and other varieties prohibited.

This Act has also been applied to the West Khandesh district (excluding Nandurbar and Taloda talukas and Navapur peta) and the talukas of Malegaon, Nandgaon, Baglan, Kalwan and Yeola of the Nasik district with effect from 1st November 1944. According to this, the cultivation of only Jarila variety of cotton has been permitted and other varieties prohibited.

With a view to augmenting food production in the Province, Section 4 of the Bombay Growth of Food Crops Act, 1944, has been applied in the year 1945-46 beginning from the *kharif* season of 1945, to all the areas of the Province, to which the Act is applicable, viz., whole of the Province except the Konkan districts, Bulsar and Pardi Mahal (Surat district), Igatpuri taluka and Peint Mahal (Nasik district), Maval taluka (Poona district) Mahableshwar Peta (Satara district), Khanapur and Belgaum talukas and Chandgad Mahal (Belgaum district) and Kalghatgi, Hangal and Kod talukas (Dharwar district). Subsequently, some modifications were made and Section 3 was applied to the Chorasi taluka of the Surat district and some individual villages of Ahmedabad and Kaira districts. Under Section 4, the proportion of the holdings to be put under scheduled food, non-food and other crops, in different talukas of different districts has been defined on the basis of the suitability of soils and climatic conditions, and the local factors. Assuming that all cultivators grow the maximum permissible area

under scheduled non-food crops and the minimum compulsory area under scheduled food-crops, the area under scheduled food crops during 1945–46, in the tract to which the Act is applied is estimated at about 200 lakh acres. Many cultivators having small holdings who could grow cotton on very small areas only, may prefer to grow food grain crops in preference to cotton and hence the estimated area under food grain crops may come upto about 207 lakh acres. The area under food crops in the tract to which the Act is not applied is estimated to be about 22 lakh acres, making a total of 229 lakh acres under food grain crops in the Province during the year 1945–46.

CHAPTER II.

SOIL AND IRRIGATION RESEARCH.

(6) *Introduction.*—The most important scientific investigations into the problems relating to the soil and to irrigated farming are being conducted at Padegaon and at Sholapur at the Agricultural Research Station, Deccan Canals and the Dry Farming Research Station, Bombay-Deccan, respectively. The former centre, which has been established from the provincial revenues on the termination of the Sugarcane Research Scheme financially assisted by the Imperial Council of Agricultural Research on 30th June 1944 now deals with research work on all aspects of irrigated farming including plant breeding, fruit culture, mixed farming and insect pests. At the Dry Farming Research Station scientific investigations have been concentrated on the evolution of improved methods of tillage, land management and crop production in scarcity areas liable to failure or shortage of rainfall.

A. The Agricultural Research Station, Deccan Canals, Padegaon

(7) This station is under the administrative control of the Deputy Director of Agriculture, Central Division, Poona, while the scientific work of the different sections is being technically supervised by the various experts of the Agricultural Department. There is also a residential officer in charge of the station who looks today to day administration and also is in technical charge of agronomic, physiological and mixed farming sections. In the Soil Physics Section, which is technically supervised by the Soil Physicist to Government, Bombay Province Sholapur, the programme of work chiefly consists of the continuation of the long-term field experiments already in progress at Padegaon Farm and the Sub-stations for the study of soil deterioration and nature of soil improvement under various systems of cultural operations, and the study of behaviour of major soil types in lysimeters. The results so far obtained have shown no deterioration in certain soil types when continuously put to cane if adequate provision is made for mixed manuring including bulky and concentrated manures. In the Crop Physiology Section, detailed investigations into the influence of climate on germination, crop growth, etc. of sugarcane were continued and useful data were obtained. The application of ten tons of molasses per acre during the maturity phase of sugarcane has been very beneficial in hastening the maturity of cane. Work is also in progress to devise suitable manurial technique for wheat and rice crops. In the case of wheat two stages, the first at the 3rd week and the second at about the 8th week, have been found to be important from the standpoint of assimilation of nutrients and increase in dry matter. Similar stages have been also observed in rice at intervals of 37 days and 77 days after

germination when tillering and pre-flowering periods start respectively. In the Agricultural Management Section, cane varietal trials as well as large scale complex field experiments on irrigation and manuring are being continued to determine the optimum irrigational intervals and the relative value of compost as well as oilcakes and inorganic manures in increasing cane yields and sucrose content. The necessity of a basal dose of organic manure to obtain the best results from the use of artificial fertilisers in top-dressings has been confirmed. Although the longer intervals between irrigation have not shown any deleterious effect on yield of cane, they have shown increase in fibre content and decrease in sucrose content. Among the varieties under trial, Co. 475 has yielded better than Co. 419 and this is now released for further trial and mill-test on the factory estates.

Among the other new sections started during the current year after the establishment of the Agricultural Research Station, Deccan Canals, the work on the Plant Breeding Section which is technically supervised by the Deputy Director of Agriculture, Crop Research, is mainly designed to improve by selection and hybridization cereal crops of *jowar* and wheat and the vegetable crops of onion and sweet potatoes. The Horticultural Section is establi hed at this Station with a view to experiment upon the methods of cultivation, manuring and irrigation of various fruits under the soil and climatic conditions obtained in the Deccan Canal tract. A nursery for raising citrus, grapevines and mango grafts has been established and the plant material which will be required for starting experiments on the above crops is being prepared. The work of this section is being carried out under the guidance of the Horticulturist to Government. The Insect Pest Section, which is under the technical control of the Agricultural Entomologist to Government, is devoting its attention to the survey of the pests on various crops and their incidence of attack in relation to season, cultural operations, manures, date of sowing, irrigation, etc. The work of this section could not be started till January 1945, owing to want of staff. In the case of Mixed Farming Section two holdings of different types have been taken up for study.

(8) *Sub-stations under the Agricultural Research Station, Deccan Canals, Padegaon.*—The primary function of the five sub-stations established in the Deccan Canal tract at Lakhmapur, Deolali, Akluj, Hol and Kopergaon is to test out on the major soil types found in the canal areas results of successful research work obtained at the main research station at Padegaon. It was proposed to add one more station on the Krishna Canal but this could not be started during this year owing to the difficulty of securing suitable site on this canal. Among these five sub-stations, the Sub-station at Hol is being utilised to investigate the effect of different systems of cropping, irrigation, manuring, etc. on the reduction of soil alkalinity. Among the various crops, onion is found to be superior to rice. In the case of severe salt incrustation rabbing has been found to be very effective. At the other sub-stations valuable data in connection with irrigation, manuring and rotations are being collected in order to evolve suitable cropping systems applicable to respective genetic soil types. The sub-stations are now financed by the Bombay Government as sub-stations of the newly established Agricultural Research Station, Deccan Canals, on the termination of the Sugarcane Research Scheme at Padegaon subsidised by the Imperial Council of Agricultural Research.

(9) *Genetic Soil Survey Scheme.*—This scheme, in which the survey and classification of lands on scientific basis has been undertaken as a commercial project has now been extended further to five other sugar factories with the total

estimated acreage of 34,850 acres and will be continued for 3½ years more from 1st April 1944. During the year under report, a total area of 10,909 acres has been completed for grid survey and 8,337 acres for profile examination. Laboratory analysis on grid samples have been completed for about 10,000 acres for six properties in order to determine the variability of fertility in these areas and colour drawings showing these variations have also been prepared for a part of this area. This scheme is financed from the Sugar Excise Fund by the Government of India; but the expenditure is practically balanced by the receipts obtained as charges from the sugar factories for the survey of their estates.

B. DRY FARMING RESEARCH STATION, SHOLAPUR.

(10) During the year under report a total precipitation of 20·1″ was recorded at Sholapur which was 5″ below the average normal figure. Lack of rains in August and heavy rainfall in September and October affected the yield of most of the *kharif* crops adversely, but the *rabi* rains proved more favourable and the performance of the *jowar* was fairly good. The efficacy of application of farm yard manure and sann in increasing crop yields has been confirmed. The effect of the adoption of the "Bombay Dry Farming Method" has been outstanding, giving a yield of 406 lbs. grains per acre as against 72 lbs. obtained by the cultivators' method. Further improvement in dry farming technique by the introduction of contour strip croping systems has been very promising in increasing the yield and conserving soil. Detailed investigations on this new system of cropping to suit different soils, climate complexes as well as soil gradients have been recently undertaken in different parts of the "problem areas" of the Province.

The Soil Section continued to concentrate on the vital problems of water and soil conservations. This is the second year in which "erosion resisting potency" of different spreading crops was tried in the controlled run-off plots. The results indicate that the potency of different crops depends not only on the inherent ability of these crops to spread and cover the land with profuse growth but also to a great extent on the agronomical aspect of the problem as rotations, fallows, manuring cultural operations and seed rates. Preliminary trials of portable silt collecting tanks to evaluate quantitatively the loss of soil by erosion on a large scale have been very promising and it seems possible that these tanks can be widely used to measure run-off erosion under natural field conditions.

(11) *Sub-stations under the Dry Farming Research Station, Sholapur.*—There have been considerable variations in the seasonal characteristics at the different sub-stations which are located on varying soil conditions. The rainfall at these sub-stations of Bijapur, Jeur, (District Sholapur) and Chas (District Ahmednagar) were 17·9″, 24·2″ and 20·3″ as against the average precipitation of 26·0″ 21·9″ and 25·3″ respectively. Inspite of these fluctuations from the average rainfall the distribution has proved to be fairly satisfactory for *rabi* crops in all the places. At all the stations the "Bombay Dry Farming Method" outyielded cultivators' method and cultivators round about were much impressed by the stand of the crop and were greatly convinced of the efficacy of the improved method.

CHAPTER III.

BOTANICAL RESEARCH.

(12) *Introduction.*—The improvement of main cultivated crops of this Province with a view to increase the quality, yield and disease resistance forms the chief

activity of the Department of Agriculture. This work is in progress at the Agricultural College, Poona, and numerous Government Farms and Research Stations throughout the Province. Considerable success has been achieved in the evolution of improved types of cotton, wheat, tobacco, rice, oi'seeds and pulses and as a result of this scientific work improved types of crops giving either higher yields per acre or fetching better prices in market due to quality are being extended widely in the districts through organised seed multiplication schemes. It is proposed to accelerate this process in the case of food crops under the "Grow More Food" Campaign with a view to cover most of the suitable area with improved strains and a number of new schemes have been started to achieve this end.

(13) *Departmental Plant Breeding Committee.*—This Committee has been functioning very effectively for the last 5 years. The Deputy Director of Agriculture (Additional) has been appointed as a member on the Committee during this year. Entire work of botanical research in the Province is first reviewed and planned at the meetings of the Divisional Plant Breeding Committee and is further considered by this Central Committee. The Committee met twice during the year and discussed several important subjects.

A. COTTON.

(14) *Gujarat—Cotton Breeding Work, Surat.*—Botanical work on cotton aims at evolving, for the South Gujarat Cotton tract, a type of cotton possessing good fibre qualities equal to those of 1027 A. L. F. in combination with higher ginning percentage. This object has not yet been completely achieved. The improved strain "Suyog" is a nearer approach to this ideal and has proved to be more profitable to the cultivators than 1027 A. L. F. particularly on account of its higher ginning percentage. It is, therefore, being multiplied and extended in this tract with a view to replace 1027 A. L. F. and also to completely eliminate the inferior cotton selection 1-A. As a result of further work of hybridisation, two promising synthetic types, viz., 7–2 and 1–4 possessing higher ginning percentage and better fibre quality than "Suyog," have been evolved and these are under critical test at present. As certain areas in South Gujarat are severely affected by cotton wilt disease research work on breeding of a wilt resistant type possessing at the same time other desirable characters is also in progress.

(15) *Gujarat—Cotton Breeding Scheme, Broach.*—This scheme, which is financed by the Indian Central Cotton Committee since 1932, has for its object the evolution of superior types of cotton for the Nerbudda-Mahi Zone. Segregates 1–2 and 1–6 which are being distributed under one composite strain "Vijaya" since 1932–33 have practically eliminated both Broach local (an inferior quality and wilt susceptible variety) and B. D. 8 (a low ginning but wilt resistant strain). Research work is now further directed towards improvement in the staple length of Vijaya cotton by hybridisation with 1027 A. L. F. and to breed early maturing types. From 300 hybrid selections so obtained, 200 individual plants possessing 38 to 41 ginning percentage and 21 to 23 m.m. staple length have been retained for further work.

(16) *Gujarat—Wagad Cotton Breeding Scheme, Viramgam.*—This scheme directed towards the improvement of the Wagad type of cotton of northern Gujarat is also subsidised by the Indian Central Cotton Committee. The ideal type of cotton required for this area, which is liable to periodic failures of rainfall and frost damage, must be early maturing with good quality fibre and high ginning percentage. As a result of research work since 1937 several promising types are now on hand. A few selected types are being tested since 1942–43 at Viramgam, Jagudan and Dholka Farms and as a result of this work 3 types, viz., W-87, B-1 and K-72-2,

are now selected for village trial in the Wagad tract of Ahmedabad district, in Mehsana prant of Baroda State and also in important Kathiawar States. Amongst them, type K-72-2 is particularly outstanding being somewhat early, good in yield and consistently good in fibre qualities.

(17) *Gujarat—Kaira Cotton Breeding Scheme, Anand.*—The work on the improvement of cotton grown in the Kaira district was undertaken in 1941 when a scheme for this purpose was sanctioned by the Indian Central Cotton Committee. It aims at the production of a suitable type of cotton to replace low ginning inferior quality perennial Rozi cotton grown over about 10,000 acres in inferior *goradu* soils of the Mahi-Sabarmati Zone of middle Gujarat. As a result of this work 9 promising Rozi selections have been selected for varietal trials next year. Trials of Vijaya are also in progress to determine its suitability in preference to Rozi in the areas concerned. The seven years rotational varietal experiment planned to study the economics and possibility of replacement of perennial Rozi cotton with the annual Vijaya indicat s that Vijaya with *kodra* gives better return per acre than Roziwith *kodra*.

(18) *Gujarat—Scheme for Research in Interspecific Hybridisation of Cotton, Surat.*—This scheme is also financed by the India Central Cotton Committee for exploring the possibilities of cotton improvement by interspecific hybridization between American and Asiatic cottons. Hybrids between these two species of cottons are self-sterile but fertility has been induced by back crossing to American cotton and by colchicine treatment. Yield trials of advanced stage cultures of such backcrosses have shown that some of them can give almost as good a yield as Co. 2 or 1027 A. L. F. (former being the American variety thriving fairly well under Surat conditions) with a good combination of ginning percentage and staple length. Some backcross cultures also possess the character of ginning percentage and staple length to a prety high degree irrespective of yield. Reports of the preliminary trials of the material at various places in India indicate that some of the types have given encouraging performance under rainfed conditions at Gadag and Jalgaon and under irrigated conditions at Coimbatore and Siruguppa (Madras Province). The promising cultures are being further selected and purified.

(19) *Khandesh—Cotton Breeding Scheme, Jalgaon.*—The object of this scheme, which is being subsidised by the Indian Central Cotton Committee, is to evolve a strain of cotton superior to Jarila in ginning percentage and which will be at least equal to the latter in yield, staple length and wilt resistance. As a result of large scale trials at Jalgaon, Dhulia and Mohadi Farms representing rich, medium and poor soils, respectively 3 cultures, viz., 197-3, 403-5 and 670-4, have shown their superiority in yield and ginning percentage over that of Jarila. Two new synthetic crosses have been also made with a view to increase further the ginning percentage and yield of 197-3 and the spinning quality of 670-4.

(20) *Southern Division—Cotton Breeding Work, Dharwar and Gadag.*—The improvement of the Kumta and Dharwar-American types of cotton grown in the Southern Division of the Province forms the main work at these stations with a view to evolve improved strains of cotton to replace the existing improved varieties, viz., Jayawant and Gadag No. 1 which are now widely grown in these tracts. At Dharwar, as a result of field selection, a number of promising selections have been obtained, among whom K. F. T. 2-3-68 has consistantly given the highest yield. This type is now being tested in cultivators' fields at the 11 centres in the Kumpta Cotton Tract. Promising synthetic material from the crosses on hand was tested for wilt re-action in a highly wilt infested plot and in pots in green house under controlled conditions. Segregates possessing combination of desirable

characters have been selected for further studies. Similar hybridisation in Dharwar American cotton has been carried out at Gadag and 10 promising families from the cross (Gadag No. 1 × Co. 2) and also desirable segragates from other crosses were tested during the year under report for yield and other economic characters and promising synthetic material has been further selected.

(21) *Poona—Scheme for Breeding Wilt Immune Varieties of Cotton.*—The work of the scheme, which is financed by the Indian Central Cotton Committee, represents co-operative research by the Plant Pathologist to Government and Cotton Breeders in the main cotton growing tracts of the Province with a view to obtain cotton strains immune or highly resistant to wilt disease. Of the 3 families of Jarila × N. R. 5 cross which combine high ginning with the characters of Jarila, one family has shown a high degree of wilt resistance in pot culture test at Poona. In connection with the work on the development of wilt resistant variety of cotton for Surat area very promising results have been obtained from 8–1 × B. C. 1–6 cross as some of the cultures, besides being very highly resistant to wilt, possess higher ginning percentage than 8–1 and approximate to 1027 A. L. F. in staple.

(22) *Deccan—Trials of Long-stapled Cotton Cultivation in the Deccan Canal Tract.*—In order to test the possibilities of the introduction of long stapled cotton cultivation under canal irrigation in the Deccan Canal tract, trials of long stapled cotton varieties obtained from Sind, Punjab, Madras and other cotton growing tracts were continued under irrigated conditions at the Agricultural Research Station, Deccan Canals, Padegaon and its five Sub-stations in the Deccan Canal tract in a periodic planting and spacing experiment. The varieties 4–1 and M–4 have shown a good promise. Almost all the American varieties are, however, found to suffer from red leaf blight, those from northern India being the worst in this respect. Among the plantings mid-April planting has been found to be of advantage.

B. RICE.

(23) *Deccan—Rice Breeding Work at Karjat and Sub-stations at (a) Vadgaon, (b) Igatpuri and (c) Panwel.*—These research centres deal with the improvement of rice crop in Thana, Kolaba, Poona, Satara, Nasik and Ahmednagar districts covering an area of over 9 lakh acres and producing approximately one-half of the total quantity of rice in the Province. Scientific research work on the rice crop is of great importance at the present time when any appreciable increase in the rice production of the Province must result from the extension of high yielding variety rather than from any increase in the area under rice cultivation. At Karjat, the work is concentrated on non-scented varieties of Thana and Kolaba districts while the Vadgaon and Igatpuri farms are engaged in breeding superior strains of scented varieties of the Deccan. The Karjat station has already evolved high yielding quality strains in Kolamba and Zinya, the fine rices of the tract to suit different types of lands and conditions. Rice strains Chibber and Chanchala have proved their superiority in Kolhapur State area. Three early high yielding quality strains newly evolved by synthetic work, namely, (1) S. C. 6–40, (2) S. C. 6–92 and (3) K. 7·184 are given out this year for district trial. A total quantity of 20,000 lbs. of improved seed of these strains was produced during the year for being distributed to regi tered seed growers for further multiplication. In the research work now in progress greater attention is being paid to the elimination of such defects as lodging, shedding of grain and to the development of such qualities as fineness and lustre.

The Vadgaon Farm has produced 3 highly scented strains of Ambemohor which give about 25 per cent. higher yield than the local varieties. At Igatpuri, rigorous selection is in progress from a large number of promising cultures of Kamod and Chimansal varieties. At Panwal, the work of selection in salt land rices of Kolaba and Thana is yet in a preliminary stage.

(24) *Konkan—Rice Breeding Work at Ratnagiri and Kumta Farms.*—At Ratnagiri no rice breeding work is conducted at present and only the strains previously evolved on the farm are being multiplied for supplying pure seed to registered seed growers. In all 13,000 lbs. of pure seed was produced for distribution. At Kumta the work done so far relates chiefly to varieties common in the Kumta-Honawar-Bhatkal zone and 3 superior strains, viz., Maskati-1315 (early), Jaddu-1061 (Mid-late) and Red Halga-244 (Late), have been evolved. It is now proposed to extend in future this work to areas and varieties so far unexplored.

(25) *Southern Maratha Country—Rice Breeding Work at Mugad.*—The Mugad Farm has evolved a number of high yielding strains of Antarsal and Mugad varieties which have become very popular in the Malnad tract of the Karnatak. These are beingnow multiplied to a large extent on this farm and this year 22,700 lbs. of pure seed were produced for further distribution among the registered seed growers. The improved strain in Dodgya rice, viz., D-622 and Yelikhirsal 4 which have far surpassed the respective locals in trials on the farms and in the district, are now recommended for cultivation in the districts. Further scientific work is in progress in which several crosses between varieties possessing special qualities have been made with a view to secure all possible desirable combinations. A survey of the whole tract has been also conducted to explore thoroughly possibilities of obtaining new selections. Manurial and cultural experiments have been also laid out newly in order to frame schedule of instructions for the cultivation of these improved varieties.

(26) *Gujarat—Rice Breeding Work at (a) Bulsar (Surat) and (b) Nawagam (Ahmedabad).*—These two stations, which have beenpartly subsidisedby the Imperial Council of Agricultural Research, have been recently opened at the end of the year under report. Samples from local varieties have been collected and are being grown for further botanical selections. *Val* breeding work will be undertaken at Bulsar during *rabi* season.

C. Wheat.

(27) *Deccan—Wheat Breeding Work at Niphad.*—As a result of breeding work on dry wheat during the past few years a number of promising strains have been evolved at this station which have done well practically all over the Province. Among the irrigated wheats, a strain, known as Niphad-4, has been evolved which combines several economic characters. Baking tests conducted for 2 years have shown it to be almost the best wheat in India for this quality. It is also rust resistant as compared to many other promising strains. All these strains of dry and irrigated wheats are under multiplication on the farm and in all 7,000 lbs. of improved seed have been produced for distribution during the current year. Selection in local irrigated wheats, namely, Baxi and Mondhya, is in progress at Niphad.

(28) *Southern Maratha Country—Wheat Breeding Work at Bijapur.*—The improvement of hard red wheats of the Karnatak which are specially suited for "macaroni" is going on for the last two years at Bijapur. Selection and synthetic work is simultaneously in progress to obtain early and high yielding hard red wheat strains.

(29) *Gujarat—Wheat Breeding Work at Arnej.*—This work has been started during the year under report and is in preliminary stages of selection.

D. Other Cereals.

(30) (a) *Bajri*.—The improvement of *bajri* is being continued at the Cereal Breeding Station, Niphad. Three strains, viz., AF-3, 28-15 and L.M.38-39 which have established their superiority on the farm, are showing differential adaptibility to different tracts on further trials in the districts. Numerous inbred strains obtained on the farm are being further synthesised for producing superior seed due to hybrid vigour. At Nadiad in Gujarat, nucleus seed of an improved strain B-207 is being multiplied in summer in order to prevent cross fertilisation and to obtain pure seed for large scale extension of the strain in the districts.

(31) (b) *Jowar.*—The breeding of *rabi jowars* for the eastern dry zone is being carried out at the Dry Farming Research Stations, Sholapur and Bijapur, under the technical guidance of the Deputy Director of Agriculture, Crop Research. Similar work on dual purpose *jowars* is undertaken at the recently established Agricultural Research Station, Deccan Canals, Padegaon. Although M.35-1 evolved at Mohol has become popular in the entire dry tract of the Deccan, the quality of its fodder is found to be inferior to the local varieties as the stem is thick, coarse and hollow. Earliness is another important characteristic to be aimed at in any scientific improvement of this crop. The work at all these stations has been thus concentrated on these two aspects and good preliminary selections have been obtained.

(32) (c) *Maize.*—The maize breeding work is being continued at Dohad (District Panch Mahals) and Arbhavi (District Belgaum) Farms. At the former station the work was seriously hampered during the year under report due to continous heavy rains during early stages and ravages by "Katra" caterpillars. At Arbhavi, a few good combinations of inbred types have given very promising material which is receiving further trial.

(33) (d) *Small Millets.*—The work of improving small millets is undertaken at several places. Work on *nagli* is done at Nadiad, Vadgaon and Igatpuri. The selection work on *kodra* is in progress at Nadiad and Hatkhamba the latter in the Ratnagiri district. Similar work on *vari* is being done at Igatpuri and Hatkhamba. At Nadiad and Vadgaon, a few types of *nagli* yielding higher than the respective locals have been produced and are under trials on the farm as well as in the districts. At the other farms the work is yet in its preliminary stages.

E. Tobacco.

(34) The tobacco crop in the Province covers an area of about 2 lakhs of acres grown mainly in two tracts, *i.e.*, Kaira in Gujarat and Belgaum in the Karnatak. Research stations for scientific work on tobacco cultivation, curing, etc. have been established at Nipani in the Belgaum district and at Nadiad in Kaira district. The main lines of work at these centres consist of the evolution of high yielding and superior quality strains from local varieties. Besides, experimental work on improved methods of tillage, manuring and rotational cropping and on the processing of the tobacco crop after harvesting is in progress.

(a) *Nipani.*—Selection work in Surti variety has given a few improved strains such as strain 20-2 and 112 and a few others which are now receiving further trials in the districts. In the cigarette tobacco, Bonanza has proved to be the best from

the point of view of both yield and quality. It has golden yellow colour and fine aroma and stands curing very well. There seems to be a very great future for the cultivation of cigarette tobacco in the Nipani tract during Post-war period when the cost of construction of flue curing barns is likely to come down. Rotating tobacco with other crops particularly irrigated ones has been found to adversely affect the quality of tobacco.

(b) *Nadiad.*—The strain S-57 has proved consistently superior to the local variety during trials for a period of three years on the farm and is now given out for further trials in the districts. Selection work is in progress in the Piliue variety and a few promising cultures have been obtained. Experiments conducted for three years on developing hybrid vigour by effecting combinations between several *bidi* and cigarette tobacco varieties have given a very promising combination of S.57 and K.49 which has consistently yielded higher than the higher yielding parents by over 50 per cent.

F. Other Crops.

(35) (a) *Oil-seeds.*—Work on the improvement of four oil-seed crops, *viz.*, linseed, sesamum, safflower and niger, is being financed from the Sir Sassoon David Trust Fund and the work is done under the guidance of the Economic Botanist to Government. The work of multiplication of linseed strain No. 10 which is found to be suitable for the Nasik district is being continued with a view to cover the whole area under linseed in this district with this improved strain at the end of three years. Sholapur 36, which is receiving large scale trials at all the Taluka Demonstration Centres in Sholapur and Ahmednagar districts, is likely to be suitable for covering about 17,000 acres under linseed in these two districts. In sesamum a few selections have been obtained giving 20 to 25 per cent. higher yield over local. Similar work in safflower and niger crops has resulted in the selection of high yielding types with higher oil content than the local material. District trials are in progress to test the superiority of the strains under cultivator's conditions.

(36) (b) *Pulses.*—The work on the genetic improvement in pulses which is financed jointly by Government and Imperial Council of Agricultural Research is now running its fourth year and aims at evolving high yielding strains of six different pulses, *viz.*, gram, *mug*, *udid*, *matki*, *kulthi* and *tur*. The work is being carried out at the Government Farms at Poona, Jalgaon and Dharwar under the supervision of the Economic Botanist to Government. About 10 to 12 good selections having desirable combinations of economic characters have been obtained in each of these pulses under study and are being tested further. The work on wilt resistance is in progress in the case of gram and *tur* at Poona, Dharwar and Arbhavi and a few selections have been found to be highly resistant. "Chafa" a gram strain evolved at Niphad, has proved its superiority in yield to local gram both in the Deccan and Karnatak.

(37) (c) *Chilli.*—Chilli is an important crop in the Karnatak and for the genetic improvement of this crop a Chilli Breeding Station financed from the Sir Sassoon David Trust Fund has been established at Hirekerur (District Dharwar). Eight selections superior in both yield and quality have been obtained and are under further trials.

(38) (d) *Agave (Sisal).*—Varieties of agave obtained from different parts of the country have been grown at Dharwar, Dohad, Poona, and Kumta. For the first time the fibre is extracted from the experimental crop at Dharwar and the yield is found to be satisfactory. The work of renovating a derelict sisal estate at Shrigonda (District Ahmednagar) which has been sanctioned for a period of three years in the

first instance from 1943 has made satisfactory progress. Nearly 5,00,000 running feet of new rows have been transplanted.

(39) (e) *Pyrethrum.*—Experimental work on the introduction of this plant in the Bombay Province has not been successful except at Panchgani where the seedlings have survived. Trials at Anjanneri in Nasik district have been a failure.

(40) (f) *Cryptostegia Grandiflora.*—This plant grows very well under irrigation and also shows satisfactory growth under rainfed conditions in Poona. This work is now discontinued as the Controller of Rubber Manufacture, New Delhi, has closed down the plots under his control at Ratnagiri and Padegaon.

G. Vegetable Crops.

(41) The work in the genetic improvement of vegetable crops has been started at the Agricultural Colllege Farm, Poona, under the Professor of Agriculture and at the Agricultural Research Station, Deccan Canals, Padegaon, under the technical supervision of the Deputy Director of Agriculture, Crop Research. The work at the Agricultural College Farm was started in October, 1943, and during the year under report about 307 varieties of English and Indian vegetables were tried both in the *kharif* and *rabi* seasons and promising selections have been isolated for further work. At Padegaon station, two vegetables, *viz.*, onions and sweet potatoes, have been taken up for improvement and samples collected from the canal tract and from outside were grown and studied both during the *kharif* and *rabi* seasons. A few promising selections have been retained for further trials.

H. Grazing and Fodder Crops.

(42) *Botanical Work on Grazing and Fodder Crops.*—A new strain of the Giant star grass has been obtained from Almora which contains less prussic acid than the African strain previously under study. Feeding trials have shown that cattle can eat this grass without any visible deleterious effect. This strain is furher multiplied with a view to find out its yield and its soil binding properties.

(43) *Provincial Fodder and Grazing Committee .*—There has been no meeting of this Committee during the year under report.

CHAPTER IV.

CROP PROTECTION.

(44) *Introduction.*—The evolution of practical and effective measures to check the damage caused by insect pests and plant diseases help considerably the increase in the production of field and garden crops. The scientific research work relating to crop protection has already made considerable progress in both plant Pathological and Entomological Sections of the Agricultural Department and in most cases remedial measures are available. The time is now fully ripe for the establishment of a widespread expert organisation in the districts to enable timely action to be taken in the early stages of attack on crops by insect pests and plant diseases and to conduct intensive campaigns throughout the Province against these enemies of crop production when and where necessary. Such an organisation would return large devidends on whatever expenditure might be incurred for its establishment and working.

(45) *Departmental Insect Pest and Plant Disease Committee.*—The Departmental Committee which was established in 1938 has the Director of Agriculture as chairman and Plant Pathologist to Government, Agricultural Entomologist to Government and Deputy Director of Agriculture (Additional) as members. This Committee held three meetings during the year under report and dealt with a large number of subjects connected with scientific research work on prevention and control of insect pests and plant diseases and the organisation of the methods of control on a field scale in the districts in connection with the "Grow More Food" Campaign.

A. Research Work.

(46) *Against Crop Diseases.*—Scientific investigations into the prevention and control of a number of plant diseases affecting all types of cultivated crops in the Province form one of the main duties of the Plant Pathologist to Government. Some of the important investigations in this line are either financed or subsidised by the Imperial Council of Agricultural Research, Indian Central Cotton Committee, etc., and the other work is done with the assistance of departmental grants. The Economic Botanist to Government is also engaged on similar scientific work dealing with the control of "Striga" attack on *jowar* and "Orobanche" attack on the tobacco crop.

(47) *Plant Virus Disease Research Scheme.*—The object of this scheme is to study the fundamental nature of plant viruses. This scheme is wholly financed by the Imperial Council of Agricultural Research and the work is done under the supervision of the Plant Pathologist to Government. The scheme is now extended for a further period of 5 years. A substantial progress is recorded in connection with research on the "Katte" disease of cardamum which is found to be transmitted in nature by an aphid, *Pentalonia Nigronervosa*, which is also the insect vector of bunchy top-disease of bananas. Valuable information has also been obtained on several other virus diseases and on the physiology of virus affected plants.

(48) *Wheat Rust Research Scheme.*—This scheme is also supervised by the Plant Pathologist to Government and is financed by the Imperial Council of Agricultural Research. It is chiefly meant to assist wheat breeders in peninsular India in testing the reactions of wheat strains produced by them against black rust with a view to develop rust resistant types. During the year under report, a large number of samples of wheat were received from the wheat breeders in the Bombay Province, Central Provinces and Berar, His Exalted Highness the Nizam's Dominions and Central India and were tested for their resistance to black rust at both the seedlings and adult stages of growth. Some of the wheats were found to be promising in respect of their rust resistant character. In a randomised trial of 8 improved strains of wheat under artificial conditions of rust epidemic in the field, Niphad-4, Bakshi-165-6 and Niphad-5-67-14-26 were found to be significantly superior to Niphad-31, Niphad-81, Bansipalli-808, Pusa-4 and Bansi-168.

(49) *Citrus Die-back Disease Research Scheme.*—The object of this scheme is to investigate the causes of sudden wilt disease and dry rot or yellowing which cause serious losses in citrus orchards in the Deccan. The scheme is financed jointly by the Imperial Council of Agricultural Research and the Governments of Bombay, Mysore and Hyderabad and is under the supervision of the Plant Pathologist to Government. A fungus is found to be associated with the plants suffering from these diseases but its role in causing these diseases is still doubtful.

(50) *Scheme for Investigation into Small Leaf Disease of Cotton.*—This scheme has been financed by the Indian Central Cotton Committee with a view to determine

the nature of " small leaf " disease which causes reduction in the size of leaves and sterility in Rozi cotton grown in Kaira district and Mungari cotton grown in the Madras Province and Hyderabad State. The disease has been definitely shown to be of virus origin. Intensive work is now being done to find out the insect vector of this virus.

(51) *Striga Research Scheme.*—The Economic Botanist to Government is in charge of this scheme which is financed jointly by the Government and the Imperial Council of Agricultural Research. During the year under report, a new scheme for the establishment of eight striga-sick plots in various parts of the Province has been sanctioned by Government for testing the resistant varieties of *jowar* obtained at Poona and selecting resistant strains from the local varieties under conditions where *striga* infestation is endemic, and work on this scheme is in progress. The Imperial Council of Agricultural Research have now agreed to finance this new scheme from the next year.

(52) *Orobanche Research Scheme.*—The work of this scheme which has as its objective the reduction of loss caused by *orobanche* attack on the tobacco crop in the Province is financed by the Sir Sassoon David Trust Fund and is under the supervision of the Economic Botanist to Government. All attempts to find varieties of tobacco and species of Nicotiana resistant to *orobanche* have failed. Further research work is now in progress on trap cropping and application of chemicals for reducing the attack of this disease.

(53) *Miscellaneous Research Work on Plant Diseases.*—(a) *Wilt in Lathyrus Sativus.*—In village trials made at Haldar in Broach District strains Indore-T-2-1, Indore-T-2-12 and Poona-S-1 which are now homozygous for hundred per cent. wilt resistance were tested against Broach local. All the three strains did not suffer any mortality from wilt attack while the local showed 20 per cent. wilt infection. The yield of the resistant strains compared favourably with the local and there are indications of a high yielding capacity in the case of Indore-T-2-12. It is proposed to test the yielding capacity of these 3 strains in replicated trials during the next season.

(b) *Koleroga Disease of Arecanut Palm.*—It has definitely been established that the fungus causing Koleroga disease enters the growing region of the tree through the point of attachment to the stem of the previous season's bunch. Infection remains latent for several years before an infected tree succumbs to the disease. In nature, arecanut trees harbouring latent infection occurred to the extent of 1·2 per cent. of the trees in a garden. Experiments are in progress to test the value of treating with fungicides and then painting with coal tar, the points of attachment of the bunches to the stem soon after they fall off at the end of the rainy season, in preventing infection.

(c) *Damping off in Tobacco Seed-beds.*—The treatment of the seed bed with Perenox J-29 in a concentration of 2½ gallons in 50 gallons of water and with Bordeaux mixture 2-2-50 was tested on a field scale. Seven applications of these two fungicides gave a complete control of damping off in the treated seed beds.

(d) *Fusarium Wilt in Tur and Gram.*—A number of cultures of Nagpur 352 gram possessing a high degree of wilt resistance have been obtained and will be further tested.

(e) *Band disease of Areca Palms.*—Preliminary investigations have shown that the disease is probably a nutritional problem being due to toxic effects produced by large quantities of available manganese or iron in soil, a condition which seems to result from the defeciency of lime and the presence of free water in the soil.

A comprehensive scheme is now prepared for submission to the Imperial Council of Agricultural Research for more detailed investigation into the nature of this disease and for the evolution of curative measures.

(*f*) *Miscellaneous*.—Bacterial blight of French Beans found in this Province has been shown to be caused by a new variety of bacterium, *Xanthomonas phaseoli* var *indicus*. Work on Verticillium wilt of brinjals and other diseases was continued.

(54) *Against Insect Pests*.—The Agricultural Entomologist to Government is responsible for scientific investigations into the prevention and control of damage by insect pests to field and garden crops. Two new schemes, *viz.*, (1) Investigations on the Kane pest on rice financed by the Government of Bombay and (2) Pests of safflower financed jointly by the Government of Bombay and the Imperial Council of Agricultural Research were taken up during the year under report. The latter scheme could not, however, be started owing to difficulties in getting the required staff. The betelvine bug investigation scheme has been terminated on 31st March 1945. As a result of the investigations carried out under this scheme it has been found that the betelvine bug can be controlled effectively when the betelvines are sprayed twice at fortnightly intervals with tobacco waste (*dhus*) of the strength of 1 in 15. The cost per spraying comes to about Rs. 7-8-0 per acre.

(55) *Biological control of Sugarcane Borers*.—The work of this scheme, which is financed by the Imperial Council of Agricultural Research, is being carried out at Walchandnagar and forms a part of the All-India Scheme to investigate into the efficacy of Trichogramma parasites in the control of this pest. Fall in borer population due to one and two sets of liberations of Trichogramma was approximately 31 per cent. and 73 per cent. respectively, as against only 9·4 per cent. in the control. The scheme has been extended for one year more, till March 1946.

(56) *Grapevine Beetle Investigation, Nasik*.—The usual "tray" method was modified into "umbrella" method, in which the beetles were collected into an inverted umbrella, smeared with kerosene oil. The gross expenditure inclusive of material and labour was Rs. 10-8-0 per acre as against Rs. 15-8-0 by the "tray" method.

(57) *Kaneroga Investigations at Kumta*.—These investigations have been recently commenced in November 1944, as a result of the serious incidence of "Kane" disease on the rice crop. Preliminary observations have indicated that damp areas favoured multiplication and carry over of this disease.

(58) *Investigations on Stored Grain Pests, Bombay*.—Trials with various insecticides like Chlorasol, Mercury powder, D. D. T., 666, etc., were undertaken. In the case of D. D. T. and 666 both these insecticides remained effective for three weeks, beyond which, their efficacy declined. Among the different insects, rice weevil was quite susceptible, while "Khapra" remained practically unaffected. The life history and seasonal activities of various pests have been also studied under laboratory and godown conditions. The extent of damage as noted in some of the godowns varied from 10 to 20 per cent.

B. Extension and Development Work.

(59) As in previous years the Plant Pathologist to Government and the Agricultural Entomologist to Government dealt with a large number of enquiries from the public covering a wide range of subjects relating to plant diseases

and insect pests on crops in all parts of the Province. These officers are also required to examine and issue certificates for freedom from injurious insect pests and plant diseases in respect of consignments of plants and plant products intended for export from the port of Bombay. Special demonstrations of control measures against Hairy caterpillar (Katra) in North Gujarat and against Deccan Wingless Grasshoppers in the Central and Southern Divisions were carried out during the year under report. In the Southern Division about 2,400 acres were dragged over at the rate of 300 acres per day so as to collect these wingless hoppers. The cost of such treatment inclusive of bagging is calculated to be Rs. 4-6-0 per acre.

CHAPTER V.

SEED SUPPLY.

(60) *Introduction.*—The organisation of the multiplication and distribution of seed of improved varieties of crops forms a very important part of the activities of the Agricultural Department. With the extension and intensification of the "Grow More Food" Campaign in the Province, these activities in connection with seed supply were greatly intensified during the year under report. A special drive was also made to introduce the cultivation of paddy on a large scale in the Deccan Canal Zone. In addition to the distribution of improved seeds, the Department also arranged to supply seeds of food grain crops to the cultivators who, according to section 4 of the Growth of Food Crops Act, had to switch over a large part of their holding to food crops. The demand from cultivators for the seed of improved varieties of crops is increasing, and more and more evidence is accumulating about the value and importance which the cultivators attach to this aspect of departmental activities. The Indian Central Cotton Committee has continued to subsidise the schemes for the extension of improved varieties of cotton in the important cotton growing tracts, viz., Southern Maratha Country, Khandesh and Gujarat.

(61) *Seed Supply in connection with the "Grow More Food" Campaign.*—In order to further the objects of the "Grow More Food" Campaign in the Province and to stimulate the production of food grains Government has provided a sum of Rs. 30,00,000 for the purchase, storage and distribution of seeds of food crops to cultivators at concession rates. As a result of the grant of this concession the loss to the Government is estimated to be about Rs. 10,00,000. The acreage under food crops has increased considerably over that of last year, especially as a result of the Growth of Food Crops Act.

A. Cotton Seed Distribution.

(62) *Khandesh-Jarila Cotton Seed Multiplication and Distribution Scheme.*—The work under this scheme which is assisted by the grants from the Indian Central Cotton Committee has now completed its eighth year. In the year under report, 16,394 lbs. of pure seed were produced at Jalgaon Farm and Mamurabad Seed Farm under strict departmental supervision. This pure seed was supplied to registered seed growers in the districts. The area organised by the department for seed multiplication was 64,005 acres and 45,860 bags of seed were stocked by the department and the approved stockists for further distribution in the next season. Out of 3, 45,790 acres of Oomras cotton area in the Khandesh tract, about 3,44,267

acres are estimated to have been covered with Jarila cotton including natural spread, the area sown with the controlled seed supply being about 2,31,362 acres.

The co-operative organisations continued to render valuable assistance in the distribution and multiplication of improved seed. Twenty-two Co-operative Cotton Sale Societies are now working in the Division for marketing and "agmarking" pure Jarila cotton. Owing to small production of cotton, however, the work of "agmarking" could not be taken up during this year and the members of Cotton Sale Societies sold their cotton without pressing. The season was very unfavourable for cotton crop and as a result its yield and quality were considerably affected. The Cotton Control Act is now applied to the whole of the Khandesh tract. It is also proposed to apply the Cotton Transport Act to this tract by restricting it, in the first instance, only to rail transport by which cotton is generally largely imported.

(63) *Gujarat (a) : 1027 A.L.F. Cotton Seed Multiplication and Distribution Scheme*.—In this scheme, which is also subsidised by the Indian Central Cotton Committee, 8,540 acres under pure 1027 A.L.F. cotton were controlled by the departmental staff during the year under report. Ten lakh lbs. of seed of this variety were purchased, stocked and distributed including 7¼ lakh lbs. of seed supplied to Chhota Udepur and Baria States. This cotton seed multiplication and extension scheme was terminated on 31st March 1945 to be replaced by a similar scheme for the multiplication and distribution of seed of "Suyog" cotton which is now introduced as a new improved variety of cotton by the Department as it gives a higher profit to the cultivators than 1027 A.L.F. mainly on account of its higher ginning percentage. The area under this new variety was 19,660 acres and 10 lakh lbs. of seed were stocked and distributed during the year under report.

(64) *Gujarat (b) : Vijaya Cotton Seed Distribution and Multiplication Scheme*.—The total quantity of pure Vijaya cotton seed handled during the year was 7,34,530 lbs., including 4,79,960 lbs. supplied to Ahmedabad, Kaira and Panch Mahals by Cotton Sale Societies. The area under Vijaya was 89,450 acres and the department controlled an area of 11,051 acres including 259 acres under pedigree seed.

(65) *Gujarat (c) : Wagotar Cotton Seed Multiplication and Distribution Scheme, Viramgam*.—This new scheme, which has been partly financed by the Indian Central Cotton Committee and partly by Government, has, as its objective, the organisation of the multiplication of Wagotar cotton seed and the extension of this improved variety in an area of 2 lakhs of acres suitable for this type in the Wagad tract of the Ahmedabad District in order to replace the local Wagad mixture as well as Wagad 8. The work under the scheme commenced from 1st December 1943 and, during the year under report, 1,04,000 lbs. of pure Wagotar cotton seed to cover an area of 5,000 acres were distributed departmentally and through approved agents. The area actually sown with this improved variety was, however, 3,700 acres. Most of this area got waterlogged due to heavy rainfall and hence only an area of 560 acres could be controlled.

(66) *Southern Maratha Country—Jayawant and Gadag No. 1 Cotton Seed Multiplication and Distribution Scheme*.—This is the ninth year of the working of the Scheme of multiplication and distribution of Jayawant and Gadag No. 1 cottons subsidised by the Indian Central Cotton Committee. During the year under report, the reserved areas for Jayawant and Gadag No. 1 were 1,11,850 and 19,600 acres, respectively, out of which an area of 89,785 acres under Jayawant and 18,048 acres

under Gadag No. 1 were rogued. The area covered under Jayawant and Gadag No. 1 cottons in the Southern Maratha Country is 6,17,830 and 1,18,000 acres, respectively. In view of the application of Growth of Food Crops Act there has been a great reduction in the area under cotton and as a result, only 61,748 bags of Jayawant and 13,273 bags of Gadag No. 1 seeds have been stocked for distribution in the ensuing season.

B. Rice Seed Distribution.

(67) Seed Multiplication and Distribution Schemes have been organised for the wider extension of improved rice varieties in Thana and Kolaba Districts under Post-War Reconstruction Scheme No. 19. The Departmental Farms at Karjat, Igatpuri, Mugad, Ratnagiri and Kumta have supplied a total quantity of 67,000 lbs. of pure seed for further multiplication through the registered seed growers. Over 61½ lakh lbs. of seed of improved varieties of rice were distributed in connection with "Grow More Food" Campaign. This work was done through the Taluka Development and Co-operative Associations and through Government depôts. Out of this quantity about 4½ lakh lbs. were distributed in the Northern Division, 6½ lakh lbs. in the Central Division, 28¾ lakh lbs. in the Southern Division and 22¼ lakh lbs. in the Konkan Division.

C. Millet (Jowar and Bajri) Seed Distribution.

(68) Seed Multiplication and Distribution schemes for the extension of improved varieties of *jowar* and *bajri* have been organised by the District Rural Development Boards. The Deputy Director of Agriculture, Crop Research, has also issued over 10,000 lbs. of nucleus seeds of improved strains of these millets for further multiplication in the districts. Over 22 lakh lbs. of improved seed of both these millets were distributed to cultivators under the "Grow More Food" Campaign. Of this quantity 16½ lakh lbs. of seed were of improved *jowar* and the remainder *bajri*. The distribution of *jowar* seed in the Northern, Central and Southern Divisions totalled about 3 lakh, 8½ lakh and 5 lakh lbs., respectively. As regards *bajri*, the distribution of seed was about ½ lakh lbs. in the Northern Division, 5 lakh lbs. in the Central Division and about 5,000 lbs. in the Southern Division.

D. Wheat Seed Distribution.

(69) Under the "Grow More Food" Campaign about 24 lakh lbs. of seed of improved types were distributed with an average of about 8 lakh lbs. each in the Northern, Central and Southern Divisions. The production of pure nucleus seed of improved wheat types at the Cereal Breeding Station, Niphad, amounted to 5,400 lbs. and at Karjat 150 lbs. which were distributed in selected districts for further multiplication work under various seed schemes. A small quantity of Jaya wheat (2,480 lbs.) was distributed in the Kolaba District for growing it as a winter crop in rice fields after the harvest of kharif rice crop and in some cases fairly good yields were obtained.

E. Distribution of Seeds of Other Crops.

(70) Under the "Grow More Food" Campaign over 1¼ lakh lbs. of "Sumeri" maize seed and 4 lakh lbs. of "Chafa" gram seed were distributed out of which 64,200 lbs. of Sumeri maize seed and 28,000 lbs. of gram seed were distributed to

cultivators at a concession rate in the Panchmahals District. The Cereal Breeding Station, Niphad, has issued 2,800 lbs. of pure nucleus seed of Chafa gram and 200 lbs. of safflower strain N-630. 500 lbs. of improved castor S-20 has been distributed by the Tobacco Breeding Farm, Nadiad. Under the Potato Storage and Supply (Military) Scheme 32,039 bags of Numbri seed potatoes were purchased at Simla at Rs. 38 per bag and distributed to growers throughout the Province at Rs. 26 per bag. Out of this total quantity 20,100 bags are issued to potato growers in Poona district alone. In addition a quantity of 1,077 bags of potato seed had been supplied to Belgaum district out of which 316 bags have been issued to potato-growers in Belgaum district and 700 bags in Dharwar district. About 4,870 lbs. of vegetable seeds of various kind worth Rs. 8,128 were supplied from the Agricultural College Farm, Poona, to cultivators. Under the Vegetable Extension and Supply (Military) Scheme, 2,773 lbs. of Vegetable seed chiefly of cabbage, cauliflower, knolkhol, beet and carrot obtained from Quetta, Kashmir and Bihar were supplied to registered Vegetable Growers.

CHAPTER VI.

LIVESTOCK WORK.

(71) *Introduction.*—The work of the Livestock Section of the Agricultural Department is divided into two main categories, viz., (*a*) scientific research into problems of breeding, feeding and management of cattle, sheep and poultry, and (*b*) utilisation of the successful results of such research work in the development and improvement of animal husbandry in all districts of the Province. The work of the Livestock Section has extended considerably during recent years and in many tracts it is being usefully supplemented by the activities of non-official organisations interested in the development of animal husbandry in the districts. District Rural Development Boards are taking an increasing interest in livestock development in the areas under their control and considerable public co-operation has been obtained in the departmental efforts to raise the standard of the livestock of the Province.

A. Livestock Research Work.

(72) *Cattle.*—Investigations in the breeding and improvement of Amrit Mahal cattle at the Bankapur Cattle Breeding Farm, especially with regard to early maturity, standardisation of type and regularity of calving, was continued during the year in accordance with the breeding policy laid down for this herd. The small herd of Gir cattle which has been maintained in order to test the suitability of this breed as a dual purpose animal in the Southern Division of the Province is doing well. Thirteen cows of this breed were in milk during the year under report. The average milk yield per head of Gir cows was 1,703 lbs., the highest being 3,446 lbs.

The chief object of the Government Cattle Breeding Farm at Tegur is to test the suitability of Dangi and Nimar cattle as a dual purpose animal for this tract and the Konkan. The foundation stocks of Dangi and Nimari breeds which have been established at this centre have given encouraging results. Two Nimar cows have yielded over 1,500 lbs. of milk, the highest being 2,123 lbs. during the lactation period. Among the Dangi cows, 6 have yielded 1,000 lbs. of milk, the highest being 1,642 lbs. It is now necessary to test these breeds under the Konkan conditions

below the *ghats* where the improvement of cattle will form in future an important part of the activities of this section. It is also proposed to conduct simultaneously investigations into problems relating to the improvement of the grass lands in this area.

Among the cattle improvement activities which are being fostered by non-official organisations in co-operation with the Livestock Section of the Agricultural Department, special mention may be made of the Improvement of the Gir breed of cattle by the Bombay Gowrakshak Mandali, the Nathu Lalji Charity Trust Fund Gowshala in Bombay Suburban District and of the Nimari breed of cattle by the Taluka Development Association, Jalgaon, at its cattle farm at Pimple, East Khandesh district. Similarly useful work is in progress on the development of Nimari breed at the farm owned by Dr. V. H. Patil at Patilwadi, West Khandesh district. The work on the improvement of famous Kankrej cattle breed of Gujarat is now being carried out by the Institute of Agriculture, Animal Husbandry and Dairying at Anand and Chharodi Farms.

(73) *Sheep—Sheep Breeding Research Scheme, Bombay—Deccan, Poona.*—This scheme, which is subsidised by the Imperial Council of Agricultural Research, commenced in 1937. The main lines of scientific works are the improvement of the Deccan breed of sheep by (*a*) selection, (*b*) crossing with the imported Merino breed and (*c*) thorough investigations into problems of feeding and management under the Deccan conditions. The progressive improvement of the selected and cross bred flocks is well maintained during the year under report and the increase in the percentage of wool in the fleece is most striking. There is now a flock of 61 ewes of the selected indigenous Deccani sheep with a predominantly woolly coat and 38 of these carry an all-wool fleece. The cross bred rams are now being utilised in grading up the shepherds' flocks in Sangola Taluka of Sholapur district, where a Sub-station at Javle has been established since 1941. A second Sub-station for investigations into the breeding and management of Merino at Nagardale in Belgaum district is established since 1943. The results of rearing of the Merino and fine woolled cross bred sheep have been very encouraging and this Sub-station is expected to form an excellent centre for the supply of stud rams for distribution in the Province.

Research work on more profitable utilisation of wool as village industry also forms an important line of work at the Sheep Breeding Research Station, Poona, and its Sub-stations. Improved methods in the preparation, spinning, weaving and dyeing of woollen articles have been evolved and instructions are given to spinners and weavers in selected villages. It is expected that, by the improvement in sheep and by the introduction of these improved methods for the more profitable use of the better wool produce, an important rural industry can be established especially in some of the most backward tracts of the Province.

(74) *The Wool Analysis Laboratory Scheme, Poona.*—As complementary to the above mentioned sheep breeding research work at Poona, a wool laboratory has been established and subsidised by the Imperial Council of Agricultural Research. Investigations are in progress on wool fibre in order to secure a useful guide in the breeding work among the station flock. A subsidiary line of research deals with the dyeing of wool and woollen articles with vegetable dues and much progress has been made in the preparation of standard shade cards, trials of fastness of different dyes, the increased range of colours and shades, etc.

(75) *Poultry—Poultry Research Scheme, Kirkee.*—The Central Poultry Farm at Kirkee includes a poultry research section financed partly by the Imperial Council of Agricultural Research under which investigations have been conducted on Indian

and imported breeds of fowls and valuable data have been obtained regarding the egg laying capacity of these breeds and their crosses and on their suitability for the Deccan conditions. Besides this, observations on poultry feeding were continued during the year under report. The results on feeding will be of special value at this time when there has been a shortage of the more commonly used feeding grains. In order to overcome one of the main dfficulties in the extension of poultry farming in villages, much experimental work has been done on the design and construction of cheap poultry houses for village use. Economics of poultry keeping is also receiving special attention at the Central Poultry Research Station, Kirkee and also the Poultry Farms at Dhulia and Dharwar. Successful and profitable results have also been achieved in Turkey breeding and rearing at all these 3 centres. Nearly 85 students, among whom 14 were from the backward classes, were trained at these farms. Military training classes of 2 months' duration were also held and 67 soldiers were trained.

B. Livestock Extension and Development Work.

(76) "*Premium Bull Scheme*".—During the year under report, 302 bulls of different breeds were distributed in the districts and 72 of the old premium bulls were granted extension of period under the "Premium Bull Scheme" to selected agents in selected villages throughout the Province. In July 1945, there were 908 premium bulls at service in different districts which represent an increase of 242 on last year's total. The work regarding the distribution of "Premium cows" for breeding purposes in selected areas is also progressing and 1,125 cows have already been issued to approved agents. This scheme forms a valuable part of the "Premium Bull Scheme" and is receiving much financial support support from District Rural Development Boards. There has been a considerable increase in the demand for both "premium bulls" and premium cows" and most marked improvement in the general standard of village cattle is noticeable in areas where "premium bulls and cows" are distributed. The Livestock Section is devoting much time and attention to this type of extension work and special schemes for the improvement of cattle amongst the backward classes are launched. As a post-war reconstruction work twelve supplementary breeding centres comprising groups of 5 villages each for the Kankrej, Khillar and Amrit Mahal breeds were established during the year.

(77) *His Excellancy the Viceroy's Gift Bull Scheme.*—This scheme which was started in 1936 was put during the last year on permanent basis by establishing "District Livestock Advance Fund" in many districts. The object of this fund is to give loans at low rates of interest to approved cultivators for the purchase of selected breeding bulls. The advantage of this fund was taken by Sholapur, Satara, Belgaum, Poona and East Khandesh districts.

(78) *Livestock Improvement Act*, 1933.—Five more villages have been brought under this Act which provides for the compulsory castration of inferior male stock in villages on the initiative of local cattle breeders and owners and with the consent of District Local Boards. The total number of villages which have now come under this Act is 92. Convinced of the advantage of this Act the cultivators in the adjacent villages are keen that the Act should be applied to their villages.

(79) *Co-operation with Gowshalas and Panjrapoles in Cattle Improvement.*—During the year under report the Livestock Section has succeeded in enlisting the co-operation of the Gowshalas at Bijapur, Sholapur and Bagalkot and proposals for

subsidising these Gowshalas for purposes of cattle improvement are under consideration. The Government of India is also taking keen interest in organising the Gowshalas as cattle breeding centres and it is anticipated that all Gowshalas in the Province will serve as nuclei for cattle breeding.

(80) *Cattle Shows, Rallies and Demonstrations.*—Under the auspices of the All-India Cattle Show Society, cattle shows were held at Mahud in Sholapur district in November 1944 ; at Rajur in Ahmednagar district in December 1944 ; at Sanand in Ahmedabad district in February 1945 ; and at Haveri in Dharwar district in March 1945. His Excellency the Governor of Bombay was present at the Mahud Show where excellent Khillar cattle were exhibited. The Rajur show dealt with the hardy Dangi breed of cattle of the western *ghats* which has created keen interest in the nomadic breeders in this area. At the Sanand show the famous Kankrej breed of Gujarat formed the main exhibit. The Amrit Mahal breed of cattle was exhibited at the Haveri show as this is a very common breed in the south of Dharwar district. Seventeen district and small cattle shows and 12 cattle rallies were organised by the Livestock Section in different districts mainly in areas where intensive work on cattle improvement has been carried out in recent years.

(81) *dvisory and propaganda work towards Livestock Improvement.*—The advisory and propaganda work has greatly expanded during this year. Several important schemes for the benefit of the cattle breeders amongst the backward classes have been organised. Farmers' Weeks were organised at all the Government farms which were well attended. Three batches of military personnel undergoing rural reconstruction courses visited the livestock farms where they were given instruction on livestock improvement. Number of taluka planning schemes have been prepared.

(82) *Formation of Milk Recording Societies.*—The Imperial Council of Agricultural Research is subsidising a scheme of milk recording societies which is at present restricted to the Kankrej breed of cattle in Gujarat. The milk yield of 135 cows of 15 villages of Sanand and Viramgam talukas of Ahmedabad district was recorded at fortnightly intervals and, at each recording, data regarding quality, i.e., fat percentage, were noted. Out of this number, 75 cows have finished their lactations during the year ; 3 cows have yielded over 3,000 *lbs.* of milk. The work of the scheme has now been merged into the activities of the Kankrej Breeders Society established in April 1943, which is also maintaining a herd book register. Up-to-date 165 members have joined the society and 692 Kankrej cattle have been accepted for registration in the herd book. A Khillar Cattle Breeders' Society which was established in Sholapur district in November 1942, to look after the interests of the Khillar breed of cattle has now over 800 members and is one of the most progressive breeding society in the Province.

(83) *District Work on Sheep Improvement.*—At the two Sub-stations at Javle in Sangola taluka of Sholapur district and at Anagwadi in Bagalkot taluka of Bijapur district the co-operation of the local shepherds has been obtained and improved rams have been introduced into their flocks for the grading up of the local sheep population. In the sheep breeding area of Sangola, there are now 69 selected rams heading

flocks of the local breeders which include about 1,600 white breeding ewes. In the other breeding area of Bagalkot taluka, 10 flocks of selected woolled sheep have been established and are now headed by farm-bred rams. The introduction of selected rams to head the flocks of the backward class agriculturists in Bijapur district is now undertaken and 30 rams have already been placed with them.

(84) *District Work on Poultry Improvement.*—This type of work consists mainly of the distribution of improved cockerels for breeding purposes in villages and of the grant of premia to selected intelligent cultivators who wish to take to poultry keeping as a subsidiary industry in their villages. During the year under report, 14 premia each worth Rs. 75 were allotted to village poultry keepers for the purchase of egg-settings, construction of improved poultry houses, etc. 556 pure White Leghorn cocks, 156 Rhode Island red cocks, 5 turkey toms and 195 White Leghorn hens were distributed free or at concession rates to cultivators and poor villagers for the improvement of their poultry. Besides 333 dozen hatching eggs of pure breeds were given out free to the cultivators. The Army units and development farms were supplied with 156 pure bred hens and 92 dozen hatching eggs from Government Farms. It is now considered essential to organise the marketing of poultry products for the benefit of poultry keepers to enable them to get better income. Some District Rural Development Boards have established small poultry farms which are proving most useful in popularising poultry keeping in villages.

(85) *Apiculture.*—Bee-keeping as a subsidiary industry has been gaining popularity in the villages in the below *ghat* areas of the Kanara district and at the close of the year under report there are 783 bee-keepers residing in 112 villages who have maintained 2,129 bee colonies and have secured 13,722 lbs. of honey worth about Rs. 20,000. The Bee-keepers' Co-operative Societies have been organised at Honavar and Kumta. It is intended to extend this activity to other parts of the North Kanara district.

(86) *Departmental Fodder and Livestock Committee.*—The Committee met once during the year under the chairmanship of the Director of Agriculture. Among the most important subjects discussed at this meeting were the improvement of fodder residues available for livestock with particular reference to rice straw, report of the investigations into the supply and demand of milk in Poona City and schemes for improvement of butter industry and of wool in villages.

(87) *Chicken and Egg Drive Scheme.*—The difficulty of securing adequate supplies of eggs and chicken for civil and military supplies continued during the year. In order to encourage the production of eggs and poultry in the Province and to start military poultry farms, a scheme called the "Chicken and Egg Drive" was put into operation to help poultry breeders and keepers to produce more and better quality eggs by giving them pure bred cocks and hatching eggs. They were also

assisted to obtain waste grains to feed their birds. The cultivators in parts of Sholapur and Satara districts had a good stock of graded birds and these parts are today producing a very large stock of eggs for both table and hatching.

There are to-day 311 registered poultry keepers in about 50 villages of Pandharpur and Sangola talukas and, in order to help them to breed more and better poultry, 279 pure bred cocks, 2,141 pure bred eggs, 2,385 graded eggs and 390 turkey eggs were supplied. In return they supplied to the Army 27,123 hatching eggs, 162 graded pullets and over 300,000 of table eggs. The demand is increasing every month and to-day the monthly output is over 5,000 hatching eggs and 500,000 table eggs. The proper method of preserving eggs under village conditions is also being simultaneously studied.

(88) *Salvage of dry cattle.*—This work is being done by the Deputy Director of Agriculture, Dairy Farming, Bombay, through the establishment of Government farms and also through organised agencies like the Bombay Humanitarian League and private authorised agents. The Bombay Humanitarian League has established five new centres in both British and State areas at Chhapi (Palanpur), Patan (Mehsana), Bijapur, Alibag and Viramgam having a total maintaining capacity of about 7,000 buffaloes. Up to the end of the year under report, 3,400 buffaloes have been sent to these league centres. About 10,000 buffaloes were also salvaged in Kaira and Panch Mahals districts by individual cattle owners. The Government has established two farms, one at Palghar and the other at Jamner for maintaining the dry stock till calving. For the former centre 448 dry buffaloes were taken from Bombay and Bombay Suburbs at an average price of Rs. 239 per head including transport and other incidental charges out of which 138 were sold at Bombay after calving to permit holders at an average, price of Rs. 511 per head. The condition of salvagad buffaloes at Palghar was very satisfactory and as a result a large number of dry cattle are expected for salvage at this centre during next year. The fear that the climate at Palghar would be conducive to abortions is not borne out by facts as the aborations work out to be only 3 per cent. The Jamner dry stock farm is intended for the salvage of 1,000 heads of dry buffaloes and buildings to accommodate these are under construction. Two large *kurans* (grass lands) of Kanduri and Sonari measuring 2,704 acres have been reserved for this Farm. It is proposed to establish more Government salvage farms ot Bulsar in Surat district, Kedgaon in Sholapur district and Mandwa Matiyad in Broach district in order to accommodate about 2,000 more dry buffaloes.

(89) *Organisation for salvage of dry cattle.*—Special staff has been appointed to control, check and inspect salvage animals in order to prevent the export of larger number of animals from rural areas than the number fixed by District Magistrates. Arrangements have been made to number every animal that goes to salvage centres to facilitate the inspection and identification of salvaged cattle.

(90) *Re-organisation of Bombay City Milk Supply.*—With the increase of population in Bombay and with the territorial restrictions on import of animals in milk, the problem of milk supply to the Bombay City had become very acute during the year under report. Government, therefore, issued several orders with a view to improve the milk supply and to arrange for its proper distribution among the population. Simultaneously rapid surveys were undertaken in Kaira, Panch Mahals, South Gujarat and East Khandesh in order to investigate the possibilities of increasing the milk supply. These surveys revealed that the only tract which has ample milk and good organisation to collect it is Anand, Borsad and Nadiad talukas of the Kaira district and arrangements are being made to get daily quantities up to 50,000 lbs. of milk to Bombay from the milk producing tract round about Anand.

(91) *Dairy Development.*—This has been achieved by organising old farms on sound lines and by establishing new farms. The Infants and Public Milk Supply Dairy Co. Ltd., Palghar, has been able to increase the supply of milk to about 2,000 lbs. per day by better care and management of cattle. About 600 acres of land belonging to this farm have been cleared up for improving the yield of grass and five existing silo pits were utilised for ensilaging. Several applications have been received for starting new dairy farms if facilities were given by Government. The only applicant that agreed to take up land for producing and bringing milk to Bombay under present conditions of railway transport was Messrs. Adarsha Dugdhalaya, Malad (Bombay). During the year under report, the firm constructed 6 pakka stables, one large well fitted with pumping plant, quarters for staff and labourers, 5 pakka silo-pits, one store room, etc. at a total cost of Rs. 1,75,000. The grass land has been developed by clearing up shrubs, small trees and putting up a live fence at a total cost of Rs. 20,000. The Farm has maintained about 300 heads of cattle including 96 buffaloes in milk purchased at a total cost of Rs. 80,000 and is now sending to Bombay 1,500 lbs. of milk a day since March 1945.

(92) *C. Agricultural College Dairy, Kirkee Poona.*—The Agricultural College Dairy although run on commercial basis is primarily a teaching institution. However, it neither possesses the necessary equipment nor the sanitary buildings to conduct its work efficiently. There is neither adequate provision for teaching and practice of animal husbandary and dairying to Degree students of the College nor any facilities to take up post graduate students. As a central institution of the Province it is keenly felt that the Dairy should be remodelled on its present site and fully equipped to conduct the teaching and research on modern lines.

The Dairy maintains Sindhi cows and Surti buffaloes for supply of milk to Sir Sassoon Hospitals, Poona Indian Nurses, European Nurses, W. A. C. (I), St. Margaret Hospital and few retail customers whenever extra milk is available.

The cost of producing milk for the year under report came to Rs. 30-1-3 for 100 lbs. and Rs. 27-2-0 were realised for the same quantity. The total quantity of milk produced was 367,858 lbs. out of which 351,294 lbs. were available for sale, the remaining being fed to calves, etc.

Most of the fodder required for feeding was grown at Manjri and Kirkee stations while some had to be bought from outside for feeding the extra buffaloes purchased for maintaining the milk supply.

CHAPTER VII.

HORTICULTURE.

(93) *Introduction.*—A good deal of the work of the Horticultural Section of the Agricultural Department is devoted to solving the difficulties of growing fruits and vegetables economically in this Province. Besides field research, the extension of fruit and vegetable cultivation has been receiving best attention of the department. One of the chief requisites to promote fruit and vegetable cultivation in the Province is the multiplication and supply of reliable and genuine nursery plants and seed. With a view to supply large quantities of genuine fruit stocks and vegetable seeds the Department of Agriculture has launched a scheme in the districts to multiply reliable plant material and seed.

The present acreage under fruit and vegetable crops are 93,049 and 1,12,521 acres, respectively, and there is no doubt that an increase under both fruit and vegetable crops would be of the greatest benefit to producers and consumers alike. It is gratifying to note that this type of work is finding a prominent place in the developmental programme of many District Rural Development Boards. A good deal of effort is also being made in training cultivators' sons in horticultural practices.

(94) *Departmental Fruit and Vegetable Committee.*—This Committee which deals with all matters connected with the development of fruit and vegetable research and cultivation in the Province met twice during the year under report under the Chairmanship of the Director of Agriculture. The Deputy Director of Agriculture (Additional) is also appointed a member of this Committee. Several important subjects relating to (*a*) district nurseries, (*b*) investigations into the methods of packing vegetable for transport, (*c*) the establishment of central vegetable depôt with a view to augment supply of vegetables to the Bombay market, (*d*) improvement and raising of vegetable seeds and such other problems were discussed and the decisions arrived at are being implemented.

A. Research.

(95) *Ganeshkhind Fruit Experiment Station, Kirkee.*—The main problems that are being investigated at this Station relate to (1) Mango and banana manurial experiments, (2) Grapevine pruning experiments and (3) Citrus and *chikku* root stock experiments. In the case of mango manurial experiments the application of bonemeal showed more encouraging results than fish-meal, sulphate of ammonia and Niciphos. For bananas, 80 lbs. of farm yard manure per tree was found to be the most economic dose and the extra amount did not increase the yield appreciably. The yield of the shy bearing Phakdi variety of grapes can be almost doubled by keeping 6-bud spurs instead of 3 usually kept by the grape growers while pruning vines. New experimental plantations to test the influence of different kinds of root stock of citrus and *chikku* are being established. A mango bud graft nursery has been established on a commercial scale and the observations on top grafting of mango trees have been concluded. The total receipts of the garden amounted to Rs. 25,321 as against the cultivation expenses of Rs. 12,750.

(96) *Investigations into the Die-back of Citrus Trees.*—The manurial experiments on *mosambi* were continued during the year under report under the supervision of the Agricultural Chemist to Government, B. P., Poona. At Ashwi, where the trees are bearing the treatment comprising a complete manure mixture in the organic

form has shown the best preformance in yield, girth and circumference. Similar results on the development of the plant are also observed at the other two orchards at Deogaon and Uttran where the trees are still not bearing. The general trend seems to be that the manurial mixture containing all the three food elements (NPK) is necessary in order to maintain proper health and vigour of the plant. The die-back disease of these plantations is being critically watched.

B. Horticultural Extension and Development work.

(97) *Establishment of District Horticultural Nurseries.*—In addition to the existing 6 districts nurseries, one new nursery was established at Nadiad. These nurseries are subsidised by grants made by the District Rural Development Boards. The district nursery at Puntamba has almost become self-supporting and has supplied over 10,000 citrus plants to the growers. Other nurseries are also making a steady progress and are expected to show substantial results in a year or two. 24,401 shade tree seedlings were distributed free to cultivators on 'arbour days' organised by the District Rural Development Boards.

(98) *District Fruit Crops Survey.*—The fruit crop survey of the Satara district which was undertaken some time ago had to be unfortunately suspended due to want of staff.

(99) *District Propaganda and Advisory Work in connection with Horticulture.*—Consequent upon the "Grow More Fruit Crops" Campaign by the Horticultural Section for increasing the production of fruits and vegetables and high prices of fruits that have prevailed during the year under report, there has been a good deal of increase in the number of enquiries for advice on starting fruit plantations on a very large scale from various parts of the Province. A demonstration in fruit preservation was arranged for the benefit of cultivators in Ahmednagar district. Horticultural stalls were put up at various shows including the War Services Exhibition. The horticultural improvement and development formed an important subject of discussion in the deliberations of most of the District Rural Development Boards in the Province. At the Ganeshkhind Fruit Experiment Station, Kirkee, over 10,000 budded citrus plants were raised and sold at cheap rates to the growers.

There was also a large demand from several military camps in Poona for shade trees and nearly 2,000 shade tree seedlings were supplied gratis to various Army units.

(100) *Victory Orchards.*—In order to assist returned soldiers to improve their economic condition it is proposed to establish mango orchards of the Alfanso variety on varkas lands in villages from which large number of soldiers were recruited and these will be handed over to the soldiers and their families free of charge. One such orchard of 900 trees has already been successfully established at Sukivli in Khed taluka of Ratnagiri district and preparations are being made to plant another orchard at Awashi in the same taluka. It is intended to plant several more Victory Orchards every year for a period of 5 years in the northern part of Ratnagiri district if lands are made available.

C. Horticultural Education.

(101) Twenty-six students attended the Horticultural Training Class at the Ganeshkhind Fruit Experiment Station, Kirkee, out of which 25 students held Government and District Rural Development Boards' scholarships. Ten

promising students selected from the last year's class were taken as Apprentices for further intensive training in practical horticulture for a period of one year. Six Apprentices are already absorbed in service, and the rest have returned to their private lands. Special nursery plots for giving large scale practice in methods of plant propogation to the students of the Horticultural Training Class and to the Horticultural Apprentices have been opened at the Ganeshkhind Fruit Experiment Station.

CHAPTER VIII

AGRICULTURAL ENGINEERING.

(102) *Introduction.*—The Agricultural Engineer to Government, B. P., Poona, devotes his attention to research work on Agricultural Engineering Problems, supervision of the departmental plants and buildings and to giving advice and assistance to cultivators in the purchase, maintenance and repairs to power plants, etc. used for agricultural purposes. In addition, this section is responsible for extending the area under irrigated crops by the construction of new wells and by improving old wells, a measure to increase food crop production under the "Grow More Food" Campaign. In order to encourage mechanical cultivation an independent section of Mechanical and Transport Engineering has been opened which is responsible for carrying out mechanical cultivation specially in the Hariali infested areas in the Southern Maratha Country and also for the supply of iron and diesel oil for agricultural purposes.

(103) *Research work.*—Inspite of difficulties experienced in getting the necessary material, research work on improvement of agricultural implements was continued during the year under report. The grass drying machine has been now taken to the Nagardale Sheep Breeding Farm for field trials as grass in sufficient quantity is available at this farm to work out the economics of drying by this method. The newly designated seed drill has not proved very promising at Jalgaon, as compared to the local drill. The clod crusher has been modified with the provision of two rows of cast iron stars lighter frame and a sitting arrangement. As a result of these modifications it is expected that more area can be worked out for the same bullock power as compared with the Norwegian harrow. It is proposed to take exhaustive trials of this implement at Manjri Farm during the ensuing year.

(104) *Extension work, advice and assistance to the public.*—During the year under report, 807 enquiries were received from the public by the Agricultural Engineer and his staff dealing mainly with boring, pumping, cane crushing and improved implements. 33 sites for power plants were surveyed and 30 estimates for their installation were prepared. 18 new plants were installed and 70 pumping plants round about Surat, which were damaged due to floods, were overhauled and repaired by the staff of the Agricultural Engineering Section. The Agricultural Engineer and his staff put up a number of departmental constructions such as potato markets and rat proof seed storage sheds. Boring plants and other machinery were let out on hire and a sum of Rs. 4,631 was realised on this account. A special class for training cultivators' sons in working oil engines and pumps was conducted at the Agricultural Engineer's workshop.

Special schemes worked by the Agricultural Engineering Section.

(105) (a) *Well and Tank Scheme.*—Two schemes for the construction of 1,300 new wells and 500 new tanks and improving 1,800 existing wells and 600 tanks within a period of 2 years have been sanctioned as a measure of "Grow More Food" Campaign.

The construction and improvement works are to be carried out by the cultivators themselves under the advice of the Agricultural Engineer. The subsidy for the construction of new wells and tanks is given upto an extent of 1/3rd of the total actual cost with a maximum limit of Rs. 500 and for improvement of wells and tanks upto an extent of ½ of the total actual cost with maximum limit of Rs. 150 for wells and Rs. 250 for tanks. The help for the remaining cost is given in the form of tagavi loan if required by the cultivator. The above financial help is given in instalments and during the year under report the first instalment has been given in 1818 cases which cover 947 new wells, 794 old wells, 12 new tanks and 65 old tanks. The work is not progressing well as a great shortage of labour is felt in rural areas. Only 35 new wells have been completed during the year under report. It is hoped that the conditions will improve next year and the work will be carried out with greater speed.

(106) (b) *Well Boring.*—This activity was revived on a modest scale last year and 6 hand boring machines were put into operations in 4 districts of Kaira, Thana, Sholapur and Dharwar where conditions for well boring are considered to be more favourable. 153 applications were received from the above four districts of which 26 cases could be taken up during the year under report. 21 bores have been successful giving the discharge of water of more than 2,000 gallons per hour, the total footage of all these 26 bores being 1329 ft.

(107) (c) *Iron and Steel Supply Scheme.*—As the cultivators were experiencing great difficulty in obtaining iron and steel for agricultural implements, a scheme was prepared by the Agricultural Engineer to Government according to which iron was to be purchased and stored by him in Bombay and then distributed to various agricultural organisations. Upto October, 1944, 1270 tons of iron was purchased out of which 847 tons were supplied to 79 different associations. After this the work was entrusted to the newly created section of the Mechanical and Transport Engineer to Government, B. P., Poona. In all, during the year under report, 4,600 tons of iron and steel 24,375 pawrahs and 12,408 pick-axes valued at about Rs. 13,00,000 were despatched to 163 associations in the Province for distributing the same to the cultivators.

(108) (d) *Diesel Oil Distribution Scheme.*—As a result of control over the sale of diesel oil many cultivators were experiencing great difficulty in obtaining their diesel oil requirements to work their engines. The Agricultural Engineer to Government was, therefore, instructed to examine each individual case and fix his quota according to actual requirements which was done by engaging special staff of 16 inspectors. Further working of this scheme along with the distribution of iron was passed on to the newly created section of the Mechanical and Transport Engineer to Government from October, 1944. During the year under report oil permits amounting to 13,000 tons were issued to nearly 2,400 agriculturists. Recommendations for the supply of 250 tons of cement for agricultural purposes were also made.

(109) (e) *Water finding work.*—This work, which is under the control of the Agricultural Chemist to Government, B. P., Poona, was continued for the third year in succession. There was a very large demand from the cultivators for the use of the machine for locating well sites having underground water current. Out of 75 applications 47 sites were tested during the year. Large number of applications have been registered for the next season to keep the machine engaged upto March, 1946.

(110) (f) *Mechanical Cultivation Scheme.*—The main duty of the Mechanical and Transport Engineer's Section has been to extend the mechanical cultivation with a view to eradicate Hariali infestation which has been a great menace to the cultivation of food crops in large areas in the Southern Maratha Country. This section is at present busy in obtaining the required number of tractors and tractor implements and training personnel to operate them. Within a period of 5 months, 16 drivers have been trained and during the course of training about 800 acres of land in Poona and 2,700 acres of land in Ahmednagar district have been ploughed.

CHAPTER IX.

LAND IMPROVEMENT WORK.

(111) *Introduction.*—The large scale experimental bunding scheme referred to in the last year's report was a success. The acreage of work turned out was large, its quality was good, and finally, inspite of a few minor objections, the public appreciated what had been done and were definitely in favour of the work being extended. In consequence, Government decided that from 1st April 1944 work on what is really Post-War Development Scheme No. 81 should be started not only as a famine relief measure but as a definite large scale land improvement work with a long term programme in front of it. Not only was work continued in full swing in the original districts of Bijapur and Sholapur, but an expansion of staff was created so as to enable work to be carried out from two centres, the original now termed, Land Improvement Section, South, to cover Bijapur, Dharwar and Belgaum districts and Land Improvement Section, North, to cover Sholapur, Satara, Ahmednagar and Poona districts.

As a result of the early experimental work it was decided to assess the general cost of improvement at Rs. 12 per acre. The whole of this expenditure is met in the first case by Government. Out of the amount, 25 per cent. or Rs. 3 per acre is not recoverable from the cultivator. The remaining sum of Rs. 9 is recoverable but under an easy instalment system of 12 annual payments of 12 As. each, recovery starting 2 years after the construction of the bunds. After allowing for the interest charges on these deferred payments the actual result is that the cost is roughly shared in equal proportions between the cultivator and Government. The Land Improvement Section is responsible for the construction of the bunds and for their maintenance during the first year after completion. After that the responsibility for maintaining the bund will rest on the cultivator and proper provision has been made in the Land Improvement Schemes Act to ensure that if this important duty is not carried out voluntarily it may be done by compulsory means.

(112) *Large Scale Bunding Projects.*—At the commencement of the year progress was good, the South Section reaching a peak labour strength of 30,000 and North 10,000. The *kharif* season was fair to poor but when good *rabi* rain fell in September and October labour fell off rapidly. The *rabi* harvest, in spite of damage to the grain yield by cold winds, was on the whole good. In consequence the labour situation remained very poor for the last half of the year and progress was in consequence disappointing. A target of 5 lakhs of acres had been aimed at, but the totals actually reached were South Section 1,32,260 acres bunded and 4,034 acres contour trenched, North Section 91,433 acres bunded and 1,238 acres trenched, or a gross total 2,28,965 acres. The cost of the operations excluding all establishment and overhead charges averaged Rs. 11 per acre in South and Rs. 12 per acre in North.

It appears, therefore, that under present labour conditions and without the assistance of machinery it will not be possible in years of good rain to work up to the full acreage of the scheme under which the designed output rises from 5 lakhs of acres in the first year to 10 lakhs in the fifth. Under scarcity or famine conditions it should be possible to get near the estimated figures.

(113) *Gully Plugging.*—Gully plugging of nallas by stone plugs and brush wood groins was undertaken mainly in Land Improvement Section, South, as a supplement and support to the contour bunding. In all 1,39,078 running feet of plugs were constructed at a cost of Rs. 1,71,301.

(114) *Dry Farming.*—While bunding alone prevents erosion of soil and by retaining rain fall preserves the moisture in it, it has always been held that the full benefit of these works, in the shape of increased crop outturn, can only be realised if Dry Farming Methods are employed in place of the ordinary cultivators' style. In consequence every effort was made to develop this side of the work to the fullest extent. Propaganda and demonstration of the correct methods of Dry Farming was the first point, and for this work both Land Improvement Sections, South and North, had a Dry Farming Section appointed with a staff of Assistants, Field Assistants and Kamgars. To enable the cultivators to have the use of the improved and altered field tools necessary for this type of farming some 16,500 implements, wider seed drills, tine teeth hoes and flat blade hoes were purchased and lent free of charge to the cultivators concerned. In addition, Land Improvement Section, South, undertook the supply and distribution of a large quantity of seed of improved varieties, including 596 bags of "M-35-1" *jowar*, 382 bags of "808" wheat and 13 bags of "18/12" gram. In this Section also a small quantity of groundnut cake manure was distributed, but as it was received rather late no marked results were obtained from its use though in Dharwar a very satisfactory increase in *jowar* yield was noted. Activities in Land Improvement Section, North, were not so marked as in Land Improvement Section, South, but this section was hampered by lack of staff, particularly of useful Kamgars.

In order to test the results, both of bunding only and also of Dry Farming on increase in crop cultivation, a large series of experimental plots were laid out in both sections. The yield of these plots was carefully harvested and weighed separately. The full results of these plot tests are on record but they may be summarised roughly by stating that, for the *rabi* season of 1944–45, bunding alone gave an increased yield with ordinary methods of 25 to 30 per cent. over the yield of non-bunded areas. If Dry Farming methods are employed in addition figures from Land Improvement Section, South, indicated that this percentage should increase to 40 for grain and 50 for fodder, while Land Improvement Section, North, indicated an increase of 100 per cent. or more from Dry Farming plus bunding as against the cultivators' method in non-bunded areas.

(115) *Forestry.*—The first principle of contour bunding is that a complete and self-defensive catchment must be undertaken, and that improvement work must start from the top of the catchment. In consequence, it frequently happens that areas of forest land, waste, or privately owned land not fit for cultivation are met with, normally at the head of the catchment and these lands must be developed. It is the aim of the Land Improvement Department to cover these lands with tree growth and grass, and as a means to this end contour trenching is normally employed. The trenches are of smaller section than the bund, being normally excavated to 2 sq. ft. section, but they are closer spaced at intervals of 100 to 150 ft. Both Land

Improvement Sections, South and North, have now a forest section of staff working under the direct control of the Land Improvement Officers. Work has been barely started in Land Improvement Section, North, where, however, most of the 1,238 trenched acres have been sown. Land Improvement Section, South, has, however, afforested the greater part of 2,04,200 running feet of contour trench where over 1 lakh of tree plants are still surviving. In addition, Land Improvement Section, South, undertook a considerable amount of road side tree planting on roads inside his project areas. In these dry districts a large percentage of casualties must be expected. At the same time the results of earlier plantings are most encouraging. Sowings in the *rabi* rains of 1943 have given Anjan and Kasid saplings of 10 to 12 ft. in height, Neem 8 ft. and Kaju 4 ft. and these in areas where the soil when first trenched appeared to be in most disheartening condition.

Forest work in both Sections will be pressed to the full in the coming year. It is hoped also that it will be possible to induce the cultivator to increase the tree population by planting or sowing trees at the base of some proportion of the bunds in cultivated lands. Such tree growth would contribute to an important extent in the the supply to the village of small timber and fuel. It is, in addition, obvious that these bare country sides are in need of wind break to decrease the velocity of S.W. west winds that blow through the *kharif* season and also to shelter the *rabi* crop at the time that grain is forming from the great damage that can be done, and was done in 1944–45 by cold and dry winds from the North.

(116) *Experimental Land Developmental Projects in Ratnagiri District.*—The experimental work started in Ratnagiri district at Sukhivli, Avashi-Asgani, Hatkhamba and Mirjole was successful and encouraging. It was, therefore, extended in the same areas under a District Land Improvement Officer (Survey) and staff. At Sukhivli, the work is confined to trenching and bunding the upper slopes with a view to impounding water and causing it to percolate through the lower fields with a view not only to replacing the inferior by superior rice, but also to shortening the present rotation necessary for *nagali* crop. In other part of Sukhivli, an area of 50 acres is trenched and nalla-plugged with a view to establishing a " Victory Orchard ". Avashi-Asgani areas aim to these objects also, but a large area under grazing is trenched and gully-plugged in order to enrich the soil and consequently improve the nutritive quality of grass for fodder. In other places the areas are trenched to establish " Victory Orchards " on the laterite warkas soil. During the year under report, 20,677 running feet of trenches were dug, 1,26,992 running feet of bunds were erected, and 12,582 running feet of plugging was constructed at a total cost of Rs. 57,877. No breaches have occurred so far in spite of very heavy rains and, at a conservative estimate, the increased yield of varkas lands is expected at 20 per cent. to continue the work and extend it to Varul, Kashedi and Bhoste villages and to explore the possibilities of extending it to other centres would form the programme for 1945–56.

(117) *Training of Staff.*—The Bunding Training Centre, Bijapur continued the training of the large staff required to cope with the expanding work. The present class is the fourth batch of 115 students, including 12 deputed from the various States. Specialised training in all branches of land improvement work, viz., survey levelling, soil erosion and control measures, forestry, dry farming land records, etc., is given in a course now lasting for nine months. During the period the students were sent out to different centres to acquaint them with the practical side of contour bunding, trenching, dry farming, forestry and correct plotting of bunds on the village maps. The course is thoroughly practical, though theory is also taught in

the class room. Officers including the Land Improvement Officer lecture to the class, once a week, in their respective subjects. A special class for training of Tracers was conducted in the course of 3 months and a batch of 25 Tracers was trained. The second batch of 22 tracers is undergoing training, which will be completed by the end of July, 1945. Further, 48 students deputed from Sholapur Dry Farming Centre were trained in surveying and levelling for four weeks. The future programme in respect of training is to train the staff just necessary for our work with a refresher course of three months.

In order to train technical personnel for the Post-War Reconstruction Schemes of the Land Improvement Section of the Agricultural Department a Dry Farming Training Centre has been proposed to be established at Sholapur. To meet the immediate needs of the Section an Interim Scheme to train up 30 Kamgars and 15 Assistants was sanctioned by Government and two training centres were started one each at Sholapur and Bijapur. Apart from a thorough training in improved methods of Dry Farming technique and farm management a general knowledge of the fundamental agricultural sciences was also imparted. The first batch of Kamgars after completing their six-months course has been released on the 1st July for appointment under the Land Improvement Section. The first batch of Assistants will be released, after one year's training, in December. The buildings required for the class rooms, hostel and staff residental quarters of the regular 5 years scheme are about to be completed.

(118) *Record of Rights and Liabilities under the Land Improvement Schemes Act.*—In Land Improvement Section, South, this work is entrusted to the Assistant Land Improvement Officer (Records) with a staff of 6 Assistants, who are also Inquiry Officers. The main function of this section is to bring under the purview of the Land Improvement Schemes Act all the Schemes, which have already been executed or are in the process of execution, to undergo all the procedures required by the law for schemes to be taken up hereafter before execution starts and to incorporate the rights and liabilities in the village record of rights. During the year under report, draft schemes for 67 villages, in which the work is either completed or is in progress and draft schemes for 181 villages in which the work is proposed to be taken up and completed within the next four years, were prepared and submitted to th Board for approval and publication in the prescribed manner. Inquiry work was completed in respect of 125 villages and reports submitted to Government of which, 38 schemes have been sanctioned by Government up to now. Record of rights work has been completed in 19 villages.

The Assistant Land Improvement Officer (Records) has also taken upon himself the work of plotting accurately the contour bunds on the village maps, which are essential for the maintenance of bunds, to safe-guard public rights and for all administrative purposes. He was assisted by a staff of 22 surveyors lent by the Land Records Department and 20 overseers from this Department, who were thoroughly trained in the work. The plotting work of 94 villages was completed, with a total area of 1,19,379 acres. It was expected that the work would be completed by the end of June, but due to obstructions from strong wind and rains, the work remains to be done in 2 villages only. The staff was disbanded from 1st August 1945 as no Plane Table work can be done during the rainy season. The programme for 1945-46 is to complete draft schemes for 94 villages, inquiry in respect of 275 schemes and record of rights work in 176 villages. Plotting work in 50 villages would be completed. The areas in Bijapur district have been nearly made up and in the remaining districts, they will now be made up, but both the items of work will keep pace with the construction work.

Land Improvement Section, North, has at present no Assistant Land Improvement Officer (Records) or record staff, but the formation of such a section is under the consideration of Government. In the meantime advantage was taken of the slack labour season in the latter half of the year to use the survey staff on mapping work. The bunds of the greater part of the area bunded were accurately surveyed and plotted on the village maps though a few of Satara are still incomplete. Schemes for 75 projects covering $8\frac{1}{2}$ lakhs of acres have been drawn up approved by the Land Improvement Board, Central Division, and recently published. Inquiry is consequently in progress and will shortly be completed.

(119) *Sir Cusrow Wadia Trust.*—Many of the original Sir Cursrow Wadia Trust Schemes were situated in or near Large Scale Bunding Projects. The work to be carried out in these schemes is exactly similar to that of the large scale bunding works. On the other hand the financing of these schemes is complicated. In addition to the Trust grant, the cultivator has to apply for and obtain cash on tagai loan. This often leads to executive difficulties which are particularly marked when the village contains non-cooperative or absentee land-holders. It has, therefore, been decided to accelerate the completion of all such schemes where this was in sight, and either to merge the remainder with adjacent large scale bunding projects or to take them up as new large scale bunding works. These arrangements will shortly be completed, and when completed, the Sir Cusrow Wadia Trust will operate chiefly under the following ways :—

(*a*) to provide amenities not covered by land improvement work which may be permissible under the Trust Deed ;

(*b*) to reduce the contribution payable by land owners under the Act in the case of poor villages or villages with a high percentage of returned soldiers or villages in which the cost of land improvement is likely to be high owing to the environment, e.g. the first three or four instalments due from land owners may be paid out of the Trust Funds ;

(*c*) as grants for repairs and maintenance of land improvement works in exceptional cases ; and

(*d*) as the whole or partial cost of experimental or pioneer work in land improvement schemes approved by the Governing Body.

CHAPTER X.

AGRICULTURAL PROPAGANDA.

(120) *Introduction.*—The "Grow More Food" Campaign formed the chief item of propaganda and all the officers of the agricultural department were engaged in this work. This work was undertaken in addition to the normal activities to popularise improved methods of agriculture and supply of better seed, manure, implements, insecticides, etc. as usual.

(121) *"Grow More Food" Campaign.*—The main objects of the intensive propaganda under this campaign were (*a*) to reduce the area under non-food crops, e.g., Cotton and Tobacco and to increase area under food crops, (*b*) to bring new areas under food crops and (*c*) to increase the outturn per acre of food grain crops by manuring and growing high yielding improved varieties. Although the results of the campaign carried out during the previous two years had been very encouraging in bringing about voluntary reduction in the area under non-food crops and in

increasing the area under food crops, it was observed that it was not possible to produce sufficient quantity of major food crops to meet the requirements. It was, therefore, considered necessary to take recourse to legislation to further these objects of the "Grow More Food" Campaign. Under the Bombay Growth of Food Crops Act, which was first published on 20th May, 1944, the cultivation of scheduled non-food crops especially of short stapled cotton was restricted in many areas of the Province and the proportion of individual holdings which must be cultivated under scheduled food crops was prescribed. In the tracts where the areas under scheduled food crops had increased to the maximum limit as a result of the propaganda, the acreage under scheduled food crops was maintained on the same basis as in the previous year by the application of section 3 of the Act. In other areas where the cultivators had not adequately responded to the propaganda carried out during previous year under the "Grow More Food" Campaign, the acreage under scheduled non-food and food crops was fixed under section 4 of the Act. As a result of this Act the maximum area permitted under scheduled non-food crops (Cotton and Tobacco) was about 25½ lakh acres as against 40 lakh acres in 1942–43 and 30 lakh acres in 1943–44. The actual area under these two crops during the year under report, however, was only 14 lakh acres indicating a large fall mainly as a result of unfavourable rains at the sowing period. The area under scheduled food crops is estimated to be about 229 lakh acres as against 205 lakh acres in 1942–43 and 207½ lakh acres in 1943–44.

Besides the increase in acreage, the activities of the "Grow More Food" Campaign were also concentrated on the increased production per acre by distribution of improved seeds and manures at concession rates and by providing irrigation facilities. Seeds of important food crops, e.g., rice, *jowar*, *bajri*, wheat, etc. were distributed on a large scale at concession rates all over the Province. Details of these concessions are given in chapter V. About 36,000 tons of ground nut cake was supplied to cultivators at subsidised rates in order to encourage the manuring of paddy, irrigated wheat and *jowar* with a view to increase their yields per acre. The total cost to Government for such work was about Rs. 13,50,000. In addition, bonemeal was distributed for paddy crop in the North Kanara district and compost manufacture was encouraged within a five miles radius of all the Taluka Demonstration Centres in the Province. Large amount of compost is also being prepared by the Municipalities from town refuse and night soil and special staff has been maintained by Government for advising these Municipalities and training their staff in the scientific composting of the town wastes. Canal water at concession rates was continued to be given to the cultivators as in the previous year. The possibility of financing the construction of temporary *bandharas* in the Kanara district to encourage double cropping of paddy was explored and a scheme was prepared. As a result of all these measures the total additional yield of food crops is expected to be about 4½ lakh tons in a normal season.

(122) *Taluka Demonstration Centres.*—Practically in each taluka in the district Taluka Demonstration Centres have been established on the fields of selected co-operating agriculturists. These centres proved a useful propaganda means for the introduction of improved methods and supply of implements to neighbouring cultivators. A Kamgar is stationed at each centre, whose duties are to guide and assist the owner to adopt improved methods of agriculture, to carry on such propaganda in the villages within a radius of 5 miles and to arrange and conduct demonstrations at the centre at convenient intervals throughout the year. 40 new Taluka Demonstration Centres were opened during the year under report, thus bringing the total number of such centres in the Province to 214, out of which, 57

are in the Northern Division, 80 in the Central Division, 47 in the Southern Division and 30 in the Konkan Division. These centres have been very useful in carrying out the propaganda under the " Grow More Food " Campaign and they also served as distribution centres for manures and improved seeds.

(123) *Well Irrigation Research Centres.*—During the year under report, Government have sanctioned a 5 year scheme for the establishment of six well irrigation research centres in each of the Agricultural Division, except Konkan Division, to carry out scientific research work on the technique and economics of crop production under well irrigation. Accordingly, six centres were opened in each of the Northern and Southern Divisions and five in the Central Division. The underlying idea of the scheme is both to work out the economics and to demonstrate the value of well irrigation. Each centre is, therefore, situated on a small area under well irrigation, particularly in tracts in which well irrigation is declining or in which there are special problems related to irrigated farming. The centres are worked by tenants themselves who agree to carry out their farming operations under the instructions and close supervision of a resident Agricultural Assistant appointed by Government. Very close attention is being paid to the (*a*) investigations into important local problems of crop production and (*b*) maintenance of reliable costing accounts under well irrigation.

(124) *Model Agricultural Projects.*—The idea of these Model Projects is to introduce all possible items of agricultural improvements on a compact area of land of about 100 to 300 acres comprising the holdings of a number of cultivators in a selected village and to work out the economics of the introduction of improvements on such a large scale. The definite programme of work for each project is carried out annually in accordance with the pre-arranged scheme of development.

Out of the three projects which are in existence in this province two are financed jointly by the Imperial Council of Agricultural Research, the Indian Central Cotton Committee and Government. The project at Rayam (Surat district) includes the lands of 30 holders with an area of 463 acres and 20 gunthas. During the year, land improvements including bunds and drains and improvements in cultivation methods were introduced. The members realised a net profit of Rs. 27 on an average per acre. The second project is at Mirakhedi in the Bhil area of Panchmahals and includes 24 holders with the total area of 317 acres. The work at this project was carried on according to the approved technical programme of work. In the case of the third project, which is financed from the Provincial revenues, an area of 445 acres owned by 22 cultivators, who are all Bhils except one who is Muslim, is selected and the work commenced from 1st July, 1944. A Bhil cultivator is very obsolete, pessimistic and never thinks of agriculture as an art or business and it is therefore expected that the development of this project will take some time in order to bring all these cultivators to take up to improved methods of agriculture.

(125) *Official Demonstrations Farmers' Weeks on Government Farms.*—These meetings of local officials and farmers are organised and held on practically all Government Farms and Research Stations in the districts. Owing to increased work, as a result of war situation, it was, however, not possible to make such meetings very successful. It is hoped that, when the conditions come to normal, such meetings will be very popular in extending knowledge and experience of work of Department and in introducing agricultural improvements throughout the Province.

(126) *Scheme for the Composting of Town Refuse into Manure.*—This scheme which is financed by the Imperial Council of Agricultural Research aims at creating interest among the municipal authorities in the proper utilisation of town wastes by

converting them into manure. During the year under report, the Provincial Bio-chemist trained a second batch of Sanitary Inspectors deputed by 8 Municipalities. In addition to this, the Assistant Bio-chemist gave compost demonstration to 16 other Municipalities who could not depute their Sanitary Inspectors for training. In all, 38 Municipalities have got their staff trained in methods of compost making out of which 32 Municipalities have adopted this process and have begun producing compost as a regular routine. Nearly 39,000 tons of compost was produced since the inception of the scheme and about 14,000 tons were sold during the same period. The question of the disposal of such a large quantity of compost produced by some of the Municipalities has become an acute problem and a scheme is being prepared with a view to popularise the use of compost as manure.

CHAPTER XI.

AGRICULTURAL EDUCATION.

(127) *The College of Agriculture, Poona.*—In order to provide trained personnel for the Post-War schemes of agricultural developments in the Province, Government have sanctioned the expansion of the Agricultural College, Poona, with the object of training at least 100 Agricultural graduates annually. Accordingly, the number of admissions to the College was increased from 100 to 150 students annually and during the year under report 169 students were admitted to the first year class. In order to facilitate the expanded activities of the College, Government have sanctioned the construction of several buildings and increase in the strength of the staff. Among the number of constructions required, the new hostel and Horticultural Laboratory were completed and a new Lecture Hall was provided by equiping one of the large rooms in the main building. During the year under report, 56 students appeard for the B. Sc. (Agre.) examination of the University of Bombay held in March, 1945 and out of these, 53 students were declared successful. The total number of students on the College roll was 307, out of which 9 were post-graduate students.

(128) *Divisional Agricultural Schools.*—There are only two Divisional Agricultural Schools in this Province, one at Dhulia and the other at Devihosur. The total strength of the Marathi Agricultural School, Dhulia, was 57 during the year under report, out of which 29 students were in the first year. 100 applications form 3 districts of East and West Khandesh and Nasik were received, out of which only 29 students were selected for training on recommendations of the Local Agricultural School Committee. The total number of students, who have passed successfully through this School during 21 years of its working, is 324 and are working in different spheres of life. The course of training in agriculture for primary school teachers for Deccan districts was also held and was attended by 11 teachers over a period of 10½ months. The Local Agricultural School Committee, Dhulia, consisting of non-officials is taking keen interest in the working of the School and trying to further the cause of the School. As result of a munificient grant from the Sir Sassoon David Trust Fund an additional hostel for 20 students has been constructed and all the students shall be now accommodated in the school hostel.

The Kannada Agricultural School, Devihosur, has completed its 31st year of working. Of the 70 applications received fron the sons of agriculturists, 20 students were admitted to the School as new entrants bringing the total strength of the School

to 34 students. So far, 370 students have passed successfully out of this School. In addition, 69 primary school teachers have received agricultural training at the School. Ten primary school teachers were under agricultural training in the School during the period under report.

The non-officially organised and controlled agricultural schools at Puntamba in Ahmednagar district and at Rajapur in Ratnagiri district are proving most useful centres for agricultural education on practical lines for the areas in which they are situated.

(129) *Agricultural Training Centres.*—In order to provide trained personnel for the "Grow More Food" Campaign and also for Post-War Reconstruction schemes, the Rural Assistants' Training Centres at Manjri, Dhulia and Devihosur have been converted into Agricultural Training Centres for the training of Agricultural Assistants and Field Kamgars. The duration of the course is one year in each case and the persons selected for these courses are considered as probationers in training and will be absorbed in the Agricultural Department after completing their courses successfully. In the case of Manjri, it is proposed ultimately to admit 75 students to each of these courses annually. During the year under report, however, only 19 students were admitted to the Agricultural Assistants' course and 25 students to Kamgars' course. In the case of other two centres the ultimate aim is to admit 25 students in each course at Dhulia and 30 at Devihosur. During the year under report, however, only 10 Agricultural Assistants and 10 Field Kamgars were trained at each of these centres and all of them are absorbed in the Agricultural Department. When the demobilisation starts it is proposed to admit only ex-soldiers to these courses.

CHAPTER XII.

MISCELLANEOUS WORKS.

A—MILITARY AND CIVIL SUPPLY SCHEMES.

(130) *Vegetable Extension and Supply (Military) Scheme.*—During the year under report, a total area of 8,855 acres has been registered under the scheme in the districts of Poona, Ahmednagar, Nasik, Surat and Belgaum. Two new centres at Bassein and at Saswad were also established. 2,773 lbs. of vegetable seed chiefly of cabbage, cauliflower, knolkhol, beet and carrot obtained from Quetta, Kashmir and Bihar were supplied to registered vegetable growers. 480 tons of groundnut cake were also supplied to the growers. Technical help is rendered by the expert staff and new area in East Khandesh and Sholapur districts are being surveyed with a view to extend vegetable cultivation. Applications for irrigation received from the growers registered under the scheme were given priority in giving canal irrigation and, in places where wells had to be depended upon for irrigation, either growers were helped to buy oil engines or assisted to get electric connection for pumping plants. The average annual supplies of vegetables and onions to various military depots from different centres amounted to 65,000 lbs. and 20,700 lbs. per day, respectively. In addition, 20,000 lbs. of vegetables from Surat and 8,000 lbs. from Poona and Nasik were supplied per day to Bombay for civil consumption.

(131) *Potato Storage and Supply (Military) Scheme.*—This scheme was organised in 1942 with the main object of producing potatoes for supply to the Defence Department. The scheme has subsequently been reorganised and expanded so as to provide for production of adequate quantities of potatoes to meet also the require-

ments of the civil markets in this Province. Under the revised scheme potatoes are grown under contract with the cultivators who are supplied their requirements of seed potatoes at the concessional rates on their undertaking to deliver their produce to Government in 3 or 4 monthly instalments at rates previously fixed with them. These rates are increased with the length of the storage period so that cultivators are fully compensated for losses due to rot and driage in storage. An important feature of the scheme is that no middle-men are employed for making purchases and as such the middle-men's profits are transferred to the potato growers as well as the consumers. Moreover, all expenditure incurred in the grading and transport of potato from the collecting centres in Poona is paid by Government. Under this scheme in October, 1943, 32,039 bags of Numbri seed potatoes were purchased at Simla and distributed at a concession rate to cultivators in the Deccan districts of Poona, Ahmednagar and Nasik. From the resultant crops 3,67,854 maunds of potatoes were purchased during the period 15th February to 10th August, 1944, and a portion of this crop was further distributed to growers as seed potatoes for planting in 1944 *kharif* season. The average price paid to the growers for their produce was Rs. 8 per maund exclusive of transport charges which were paid by Government. The scheme has brought considerable prosperity to the grower and has been an unqualified success both from his point of view and that of the consumer including the Defence Department who were able to purchase their requirements at a cheap rate. The scheme is now extended to Belgaum and Dharwar districts and 1,077 bags of potato seeds have been utilised, out of which 316 bags were distributed in Belgaum district and about 700 bags in Dharwar district.

B. OTHER SCHEMES.

(132) *Crop Cutting Experiments on Rice in Kolaba district.*—A crop cutting experiment on rice by stratified random sampling method was undertaken in Kolaba district jointly by the Imperial Council of Agricultural Research and the Bombay Government with a view (1) to estimate the outturn of rice produced in the district and (2) to develop a technique suited to such estimation. The experiment proved very successful and the yield of rice in the district could be accurately estimated with an experimental error of only about 3½ per cent. On the basis of results obtained in this experiment the scheme is now being extended to all the rice growing areas of the Province. A qualified Statistician has been appointed in the Office of the Director of Agriculture to supervise crop cutting experiments and it is proposed to extend these experiments to other crops in the near future.

(133) *Scheme for the Production of Nucleus Seed of Improved Strains of Crops.*—In order to supply reliable seeds of improved strains of food crops to meet demand in large scale cultivation, a nucleus seed production scheme has been started under the Deputy Director of Agriculture, Crop Research, from 1st April, 1945, for rice, *jowar*, wheat, gram and bajri on different Government Farms. The pure seed of improved strains of crops is now being produced on an aggregate area of 391 acres.

(134) *Crop Weather Observation Scheme.*—The Agricultural Meteorologist of the Indian Meteorological Department has launched a country-wide scheme for crop weather observations under the auspices of the Imperial Council of Agricultural Research. The scheme is meant to investigate the influence of weather on the growth of crops and an Agricultural Assistant has been appointed at practically every important Government Farm, and necessary meteorological apparatus has been

provided. All these agricultural assistants have now received a three months' training under the Agricultural Meteorologist at the Meteorological Observatory, Poona, and the work of observations has been started.

(135) *Crop Improvement Project, Ratnagiri.*—An intensive trial on a village-wide scale has been carried out in 3 villages in Khed taluka for distribution of improved seeds of Paddy and *nagli* to replace local varieties and for manuring these crops with groundnut cake. The results have been very encouraging and this activity is worth expansion during the Post-War period.

CHAPTER XIII.

ADMINISTRATION AND FINANCE.

A. ADMINISTRATION.

(136) *Introduction.*—During the year under report, the important activities, such as, (1) the "Grow More Food" Campaign, (2) Land Improvement, (3) the Civil and Military Vegetable and Potato Supply Schemes, (4) Organisation of Bombay City Milk Supply Scheme, (5) the Scheme for Supply of Iron and Steel to Cultivators for Agricultural Implements, (6) Scheme for Supply of Groundnut Cake to Cultivators, (7) Scheme for Composting Town Refuse into Manure and (8) Scheme for Supply of Eggs and Chickens to Military were continued vigorously. In Addition, (1) Scheme for training Tractor Mechanics under the Mechanical and Transport Engineer to Government, B. P., Poona, (2) Scheme for training Dry Farming Assistants and Kamgars at the Dry Farming Training Centre, Sholapur, under the Soil Physicist to Government, B. P., Sholapur, (3) the scheme for Well Boring on more extensive scale, (4) seed multiplication schemes for the important food crops like, rice, wheat, *Jowar*, *bajri*, etc. were started during the year.

The Bombay-Deccan Sugarcane Research Scheme, Padegaon, financed by the Imperial Council of Agricultural Research, was closed during the year under report and a new station, known as Agricultural Research Station, Deccan Canals, Padegaon, was started in its place.

The scientific Research was carried on as before, in spite of the limitation and handicaps imposed by war conditions.

The generous financial assistance of such bodies as the Imperial Council of Agricultural Research, the Indian Central Cotton Committee, the Sir Sassoon David Trus Fund and the Sugar Excise Fund in subsidizing important research activities has been continued. In addition, Government of India was pleased to allot funds from the Central Revenues and the Cotton Cess for furtherance of activities in connection with the Food Production Campaign, such as, purchase of improved seeds, etc.

(137) *Staff.*—Sir William J. Jenkins, C. I. E., held charge of the post of the Director of Agriculture till about the middle of March, 1945, when he was deputed abroad and granted leave. Dr. G. S. Cheema, officiated as the Director of Agriculture.

The undernoted major changes in the staff took place during the year under report :—

Mr. D. B. Sothers, C. I. E., Land Improvement Officer (General) was appointed to be in charge of the Land Improvement Section.

Mr. Hari Singh, M. B. E., Assistant to the Utilisation Conservator of Forests, was appointed to the newly created temporary post of Land Improvement Officer (North), Poona.

Mr. S. R. Gandhi, Assistant Horticulturist to Government, officiated as Horticulturist to Government, vice Dr. G. S. Cheema and Mr. I. A. Sayed officiated as Assistant Horticulturist to Government vice Mr. S. R. Gandhi.

Dr B. N. Uppal, M. B. E., Plant Pathologist to Government, officiated as Principal, Agricultural College, Poona, vice Dr. G. S. Cheema.

The post of the Divisional Superintendent of Agriculture, Konkan Division, was converted into the post of a Deputy Director of Agriculture, Konkan Division, in class I of Bombay Agricultural Service and Mr. V. S. Kulkarni was appointed to hold it.

Dr. B. S. Kadam, Deputy Director of Agriculture, Crop Research, proceeded on deputation to the Government of India and Mr. V. M. Chavan, Assistant Professor of Botany, Agricultural College, Poona, officiated as the Deputy Director of Agriculture, Crop Research. Mr. S. Soloman officiated as Assistant Professor of Botany vice Mr. V. M. Chavan.

Mr. A. A. Vasavada, Professor of Agricultural Engineering, Physics and Mathematics, Agricultural College, Poona, was appointed as Propaganda Publicity and Training Officer, Land Improvement Section, Bijapur.

Mr. P. N. Driver, was appointed to officiate as Professor of Agricultural Economics, Agricultural College, Poona in class I of Bombay Agricultural Service.

Mr. B. S. Patel continued to work as Deputy Director of Agriculture, Dairy Farming, till 31st March, 1945.

A temporary post of the Mechanical and Transport Engineer was created during the year under report and Lt. Col. Bates appointed to hold it.

During the year under report, Rao Bahadur S. S. Salimath, Deputy Director of Agriculture, Head-Quarters, was granted further extension of service for one year for work in connection with the "Grow More Food" Campaign. Mr. T. R. Khaladkar, Professor of Veterinary Service, Agricultural College, Poona, was also granted an extension of service for one year from 5th December 1944.

(138) *Retirement*.—During the year under report, Rao Saheb M. L. Patel, Cotton Breeder, S. M. C., Dharwar, and Mr. J. G. Naik, Cotton Superintendent, Surat, retired from service.

Rao Saheb M. L. Patel entered service in 1912 and worked as Cotton Breeder in Gujarat and Southern Division, till retirement. He was awarded the title of Rao Saheb for his very valuable work in the cotton breeding line. He worked as a Crop Botanist to Government for about one and a half years during 1938 to 1940 and also as Deputy Director of Agriculture, Southern Division, Dharwar, in addition to his own duties in 1941.

Mr. J. G. Naik entered the subordinate Agricultural Service in 1914 and retired as Cotton Superintendent early in 1945 after a long and useful service of over 30 years.

(139) *Obituary.*—During the year under report, the Agricultural Department suffered the grievous loss by the death of Rao Bahadur C. G. Paranjpe, late Agricultural Engineer to Government of Bombay. He joined the Department of Agriculture in subordinate service in 1911 and retired as Agricultural Engineer on superannuation in 1941. He worked as Assistant Agricultural Engineer from 1925 to 1932 and was appointed as Agricultural Engineer to Government in 1933, in which post he retired. He was awarded the title of Rao Bahadur for very valuable work in Agricultural Engineering line. He was very capable and popular officer of this Department and his death shortly after retirement is much deplored by his colleagues in this Department.

B. FINANCE

(140) *Departmental Expenditure and Receipts.*—The expenditure of the Agricultural Department for the year under report amounted to Rs. 1,14,22,017 as against Rs. 54,59,422 in the previous year. This considerable increase in expenditure is largely due to the expansion of the Departmental activities particularly the Land Improvement Section and to the more intensive workin of the various schemes under "Grow More Food" Campaign and addition of many other new schemes during the year under report.

The receipts of the Department from all sources were Rs. 28,36,569 as against Rs. 4,46,556 in the previous year. This increase is mainly due to the general rise in the prices of the farm produce and sale of groundnut cake and bonemeal manures.

(141) *Subsidies and Grants.*—The undernoted subsidies and grants were received for expansion and research work and other departmental activities during the year :—

	Rs.
(1) From the Imperial Council of Agricultural Research for various research schemes	72,662
(2) From the Indian Central Cotton Committee, for research schemes and multiplication and distribution schemes, etc., dealing with the Cotton Crop	1,13,300
(3) From the Sugar Excise fund of the Government of India for work on the improvement of sugarcane cultivation	7,752
(4) From the Trustees, Sir Sassoon David Trust Fund, for Research Schemes of the Agricultural Department ...	17,776
(5) From the Government of India from the fund for the benefit of cotton growers, Food Production Campaign	1,09,956
(6) From the Government of India from the Central Revenues in furtherance of Food Production Campaign	15,13,125
Total ...	18,34,571

(142) *Personal Ledger Accounts.*—The undernoted amounts were placed at the disposal of the Director of Agriculture, and the various other officers of the Depart-

ment during the year under report for financing seed distribution work, "Grow More Food" Campaign, Potato Supply Scheme, livestock improvement work and scheme for supply of iron and steel to agriculturists in the Province :—

	Rs.
(1) Personal Ledger Account of the Director of Agriculture for financing cotton and distribution work ...	,14,000
(2) Personal Ledger Account for "Grow More Food" Campaign, at the disposal of the Divisional Deputy Directors of Agriculture	36,79,000
(3) Personal Ledger Account for purchase of Numbri seed potatoes from Simla for supply to potato growers and for storage and supply of potatoes to Military authorities at the disposal of the Plant Pathologist to Government, Bombay Province, Poona	46,90,268
(4) Personal Ledger Account at the disposal of the Livestock Expert to Government for making advances to approved cultivators for the purchase of "premium bulls and cows"	20,000
(5) Personal Ledger Account at the disposal of the Mechanical and Transport Engineer to Government, for purchase of iron and steel for supply to agriculturists through organised bodies	25,00,000
Total ...	1,12,03,268

G. S. CHEEMA,
Director of Agriculture,
Bombay Province, Poona.

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